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DEVOTED TO THE CONVERSION, TRANSMISSION and DISTRIBUTION OF ENERGY.

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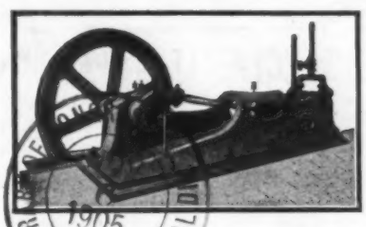

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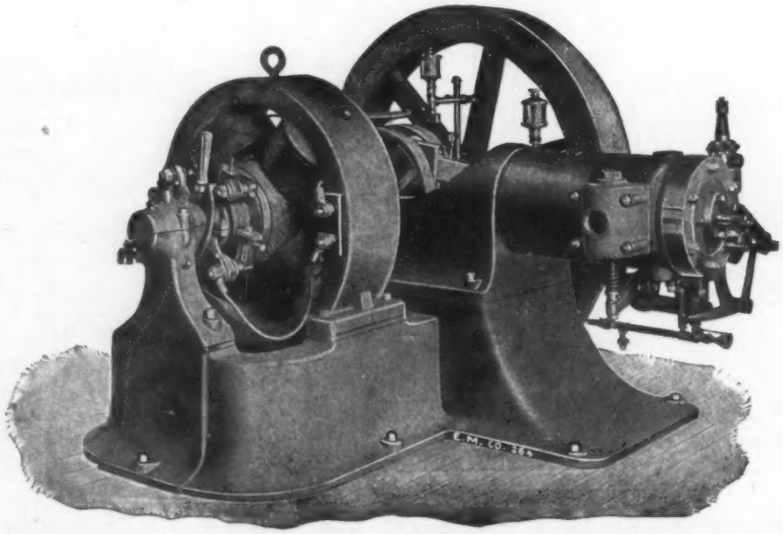


The Journal of Electricity, Power and Gas.

Devoted to the Conversion, Transmission and Distribution of Energy.

VOLUME XV. SAN FRANCISCO, CAL., NOVEMBER, 1905. NUMBER 11

The Washoe Power and Development Company's Plant on the Truckee River.

EVER since the first remarkable mining discoveries in and about Tonopah, the state of Nevada, still famous for the once great wealth of the Comstock, has experienced an awakened activity centering very

THE HEAD DAM

largely at Reno, the point of departure to the mining camps.

The railroad town of Sparks, three miles east of Reno, sprang into sudden existence with the removal there of the Central Pacific Company's shops and almost coincident with its building came a street and interurban electric railway as the connecting link between the two cities.

In line with other developments the incorporation of the Washoe Power and Development Company was effected by a few local capitalists who joined forces, subscribed the necessary funds and proceeded, with unswerving energy and faith in the success of the enterprise, notwithstanding already established opposition, to build a power plant which should supply Reno and Sparks with the best possible service at a reasonable rate.

The company was incorporated with the following board of directors: John E. Humphrey, George W. Robinson, John N. Evans, Charles E. Clough and J. A. Moynihan and the officers elected were J. E. Humphrey, president and general manager, and Frank H. Norcross, secretary, who was later succeeded by C. F. Loring.

Water rights on the river and lands for water conduits and power station had been secured many months before active work was inaugurated on the canal and flume, in the late summer of 1904, while contracts for machinery and buildings were let toward the end of September of the same year.

A head or fall of eighty-five feet is obtained at the power station located on the Truckee river, approximately eight miles west of Reno and distant a few hundred feet from the main line of the Central Pacific, just across the river. From here the power is transmitted to Reno and thence to Sparks, three miles further on.

Two and a half miles above the power station and a short distance east of Verdi, a small island divides the course of the river into two channels and at the head of the island is situated the main dam, a structure of rock-filled, timber cribs, heavily planked and four feet in height, which diverts the water into the smaller channel and at the same time serves as a spillway along its entire crest during periods of high water in the river. The smaller channel conducts the water under a high bluff forming the south bank of the river, to the headgates and intake tunnel through the lower, or easterly end of the ridge. Below the intake, a smaller dam of similar

THE CANAL

construction serves to divert water into the tunnel and as a spillway for excess flow.

Four headgates controlling the flow into the tunnel are built of double plank, through bolted and spiked, and

A PORTION OF THE FLUME

are raised or lowered in wooden guides by means of screw stems, heavy nuts and ratchet capstan bars. The abutments at the entrance to the gates are of solid masonry.

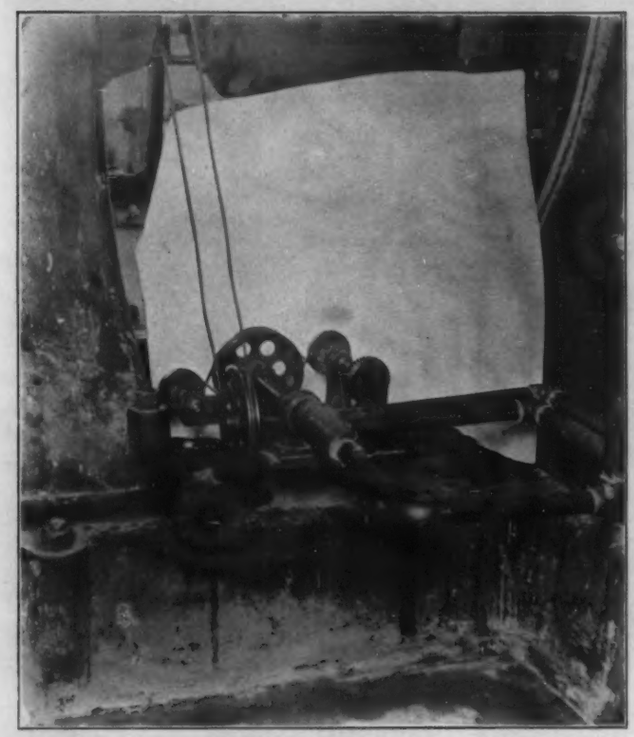
The tunnel penetrating the end of the ridge or bluff forming a bend of the river, is approximately three hundred feet in length, terminating in an open cut, which is in reality the beginning of the canal. The tunnel was driven through the ridge by hand in small, irregular section just large enough for convenient working and on completion of the dams and head works sufficient water was turned through to sluice the material broken down from above the lower portal of the tunnel, through a flume, into the river. Thus an open cut of considerable width was extended back until the banks became too high for economic working when the remainder of the tunnel was enlarged to a uniform section, seven feet by ten feet, back to the headgates.

Commencing at the open cut, the canal passes under the Central Pacific tracks through a massive, concrete culvert. Thence it continues to the forebay above the power station, following in a general direction the meander of the river and broken by two sections of flume, aggregating approximately half a mile in length. The canal is fifteen feet wide at the bottom, twenty-seven feet wide at the top and carries water to a depth of six feet. It is constructed on a grade of two feet per mile, or one foot in 2640 feet, and has a capacity of three hundred and forty cubic feet per second. The major portion of the canal was constructed with teams and scrapers. Where rock was encountered stone boats were used in removing boulders to the outside of the fills and pick and shovel work was necessary only at a few points along the line where it was impossible to use teams in cutting back overhanging banks. The formation almost throughout is coarse gravel, clay and sand in a mixture not difficult to work and at the same time apparently setting after contact with water into a compact bank which permits of little or no seepage.

ONE OF THE BATTERIES OF RELIEF VALVES

FOREBAY AND PIPE LINES

The flume connecting the sections of ditch differs in several particulars from the usual type common to the Coast. In crossing small canyons it is supported on bents founded on concrete piers, but otherwise the stringers are laid on masonry mudsills elevated slightly above the grade cut out of the hill side. The frames are spaced four feet apart and the posts mortised into sills and caps, and fastened with wooden pins driven through mortise and tenon. Sides and bottom are of tongue and groove, surfaced pine, spiked to sills and posts. The flume is ten feet in width, seven feet in depth and designed to carry six feet of water when flowing full. Spill-ways are provided at convenient intervals along the line, fitted with flash board stop and spill gates for use under emergency conditions. The entire length of conduit is fenced to prevent damage by cattle and several bridges have been pro-



ONE OF THE PILOT VALVES

vided, giving access to lands under cultivation on either side. The fence wires are used for telephone communication between power house and head works.

At the lower end the canal terminates in a few hundred feet of flume leading into the forebay. An ample spillway over the side of the main flume into a small flume on a very heavy gradient suffices for the care of excess water at time of light load. Waste water is conducted a short distance down the hill in the flume and allowed to take its own course into the river.

Before reaching the forebay the water is passed through double screens of wire mesh as well as a grizzily composed of iron bars of trapezoidal section.

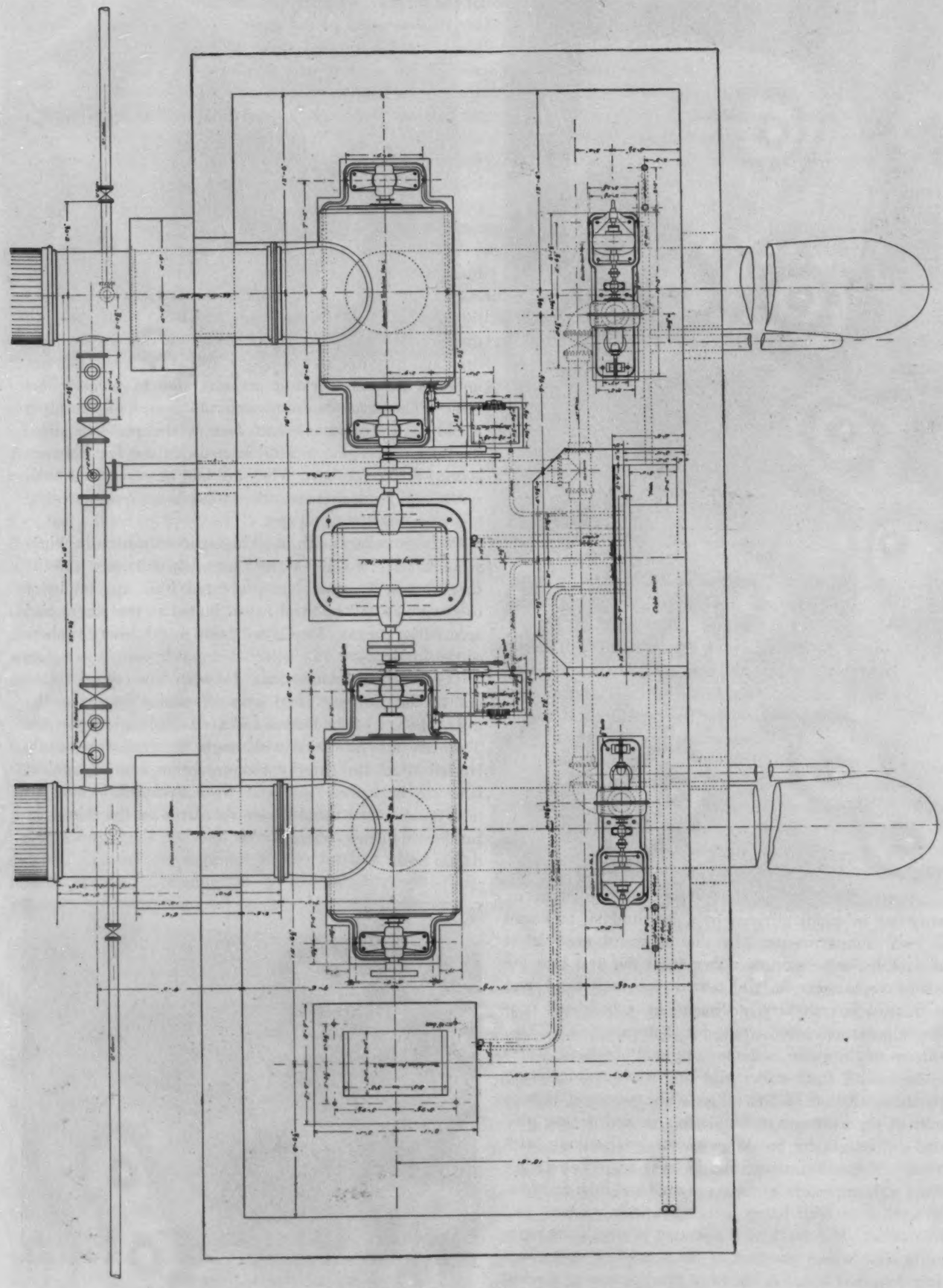
The forebay is constructed entirely of wood on concrete foundations and is thirty-four feet in length by twenty-one in width, divided by a longitudinal bulkhead into two compartments. In the bulkhead are placed gates for the admission of water from the first into the second compartment, in which two pipe lines head, and this in turn is transversely divided by a bulkhead providing a separate compartment for each pipe line. Thus, by means of the gates in the longitudinal bulkhead, water may be cut off from either pipe line without interfering with the operation of the other. The side and bottom planks of the forebay are double tongue and groove pine made water-tight by breaking joints and caulking with oakum. The entire structure is held rigidly together against water pressure by means of inch and inch and one-half steel rods with heavy nuts, cast iron washers and turnbuckles. The depth of the section in which the pipes head is sixteen feet and that of the second or upper section is four feet less. A stairway gives access to the top of the forebay, which is planked over to form a platform for the operation of the gates. The latter are of double plank fitted with iron shoes let into the bearing edges and sliding against iron faced guides. The gate stems are threaded steel rods two and one-half inches in diameter passing up through a substantial head frame on which are secured heavy bronze nuts fitted with rachet levers, forming a slow but most effectual means of raising or lowering the gates. Sluice pipes are provided in the pipe compartments for draining off the water below the intakes.

Two lines of wooden stave pipe of sixty-six inches inside diameter extend from the forebay to a point just outside the power station and are connected to the inlet thimbles of the turbines by cast-iron pipes passing through the building wall. The lines are each two hundred and fifty-five feet in length and at the lower end are under a normal working pressure due to seventy feet head. The distance from center to center of the pipes is thirty-three and one-half feet at the power station, the lines converging to a distance of sixteen feet between centers at the forebay. They are laid on compound horizontal and vertical curves, the radius in no instance being less than four hundred feet.

Wooden collars with caulking spaces around the pipes serve to effect a water-tight joint at the entrance into the forebay and the pipes are prevented from any tendency to slip down hill by steel bands bolted to the staves and secured by means of eyes and bolts to the heavy timbers of the forebay.

The cast-iron connections between the wood pipes and the turbines are fitted with companion flanges to the inlet thimbles of the flumes and are bolted rigidly thereto. They are also provided with angle iron collars securely riveted about the exterior circumference, resting against concrete buttresses built out from the station wall, to take up end thrust and divide the stress on the flumes or turbine housings between the inlet thimbles and foundation bolts.

THE POWER STATION AND TRANSFORMER HOUSE



PLAN OF POWER STATION

At the joints with the pipe lines the staves butt against the bell mouths of the iron connecting pieces, which overlap the ends of the staves for a distance of six inches, leaving just sufficient space between wood and iron for

THE TAIL RACE

caulking and pouring of a lead joint. A stiffening ring of steel closely fitting the inside of the pipe and let into the wood serves to hold the staves rigid from within. The connecting pieces are provided with six-inch drain outlets and gate valves and are cross connected by a sixteen-inch riveted steel pipe, from which one fourteen-inch connection is taken beneath the floor of the station branching to each exciter turbine. Sixteen-inch gate valves are placed near each end of the cross-connection and between these and the main pipes two vertical six-inch outlets with gate valves are placed, on which are mounted the two batteries of safety or relief valves for protecting the main pipe lines against water ram.

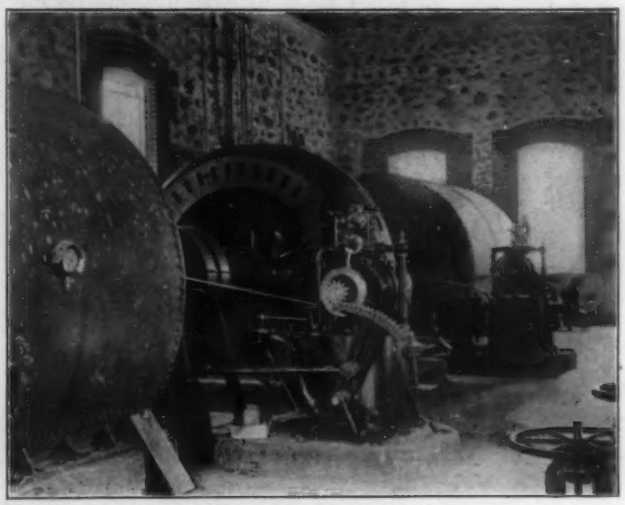
With the above arrangement each pipe line is always protected by its own relief valves while at the same time water for operating the exciters may be drawn from either or both lines.

Since the safety valves just mentioned are an entirely new design, produced by the Pelton Water Wheel Company especially for this plant and containing some unique features, a more detailed description may be of interest.

Heretofore safety valves have ordinarily been counterbalanced by hydraulic or spring pressure such that only the excessive pressure comes against the valve disc, which results in the valve opening, allowing a quantity of fluid to escape until the water ram has been relieved. Before this occurs, however, the velocity of the water through the valve opening has attained such proportions, that the valve is with great difficulty returned to its seat, usually resulting in the pressure falling below normal. The objections to the older forms of valves are, therefore, that the pressure must rise considerably above normal in order to unseat the valve and when once opened the pressure must drop considerably below normal before the valve will close—in other words the valves are not sensitive to slight increments of pressure. It is obvious that a sensitive valve would be held upon its seat by a slight difference in pressure during the normal operation of the plant, and this slight difference would cause a tendency to leak and damage the seat by cutting action at the same time favoring the introduction of leaves and debris, which might result in rendering the valve inoperative.

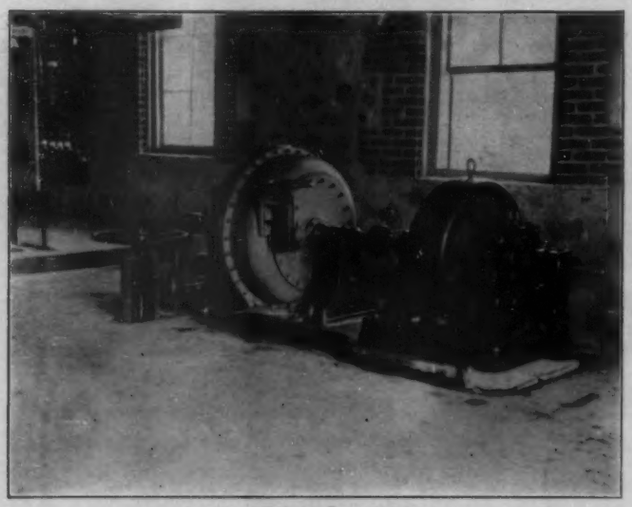
To avoid these difficulties, it is necessary that a considerable amount of pressure should be exerted against the valve to hold it on its seat, and that on any slight rise above the normal of the pressure in the main line, this holding pressure be reduced so as to permit the valve to rise and relieve the pressure in the main line. Again, upon the restoration of the *normal* pressure in the main line, the seating pressure on the valve should be re-established to close and hold it tight upon its seat.

This result is very effectively accomplished in the present instance by means of pilot valves located on the turbine frames and rotated from the main shaft by means of a small pulley and worm gear to obtain very slow rotation. Rotation of the valve is not essential to its proper operation but is introduced to prevent any tendency to stick after having remained unused over considerable periods of time. Hydraulic pressure taken from the main lines and exerted against a plunger larger than the valve opening is controlled through the rotating pilot valves. A slight change in normal pressure shifts the pilot valve in one direction or the other, exposing a discharge port from the cylinder of the relief valves, enabling them to rise when an increase above normal pressure occurs and when a decrease takes place the pilot valve moves at once in an opposite direction, shutting off the discharge and admitting pressure to restore the relief valves to their seats. The operation is quite delicate but very positive and such that no water flows through the pilot valve except sufficient to control the action of the main valve. Settling chambers are provided to prevent the clogging of the pilot valve and all packing and gland friction losses are practically eliminated by its



A VIEW OF ONE OF THE MAIN UNITS

rotation, thus securing extreme sensitiveness. The system is provided with the necessary adjustments to enable the valves to be set to operate at any desired increment



ONE OF THE EXCITER UNITS

of pressure and its simplicity and accuracy leave little to be desired.

Each pipe line is protected with two double beat six-inch relief valves having six-inch circular seats and equivalent to one eight and one-half-inch single valve. Each set of relief valves is controlled by a separate pilot valve and connected thereto by pipes through the wall of the station. These valves have now been in operation for several months with entire success from the start.

The machinery is housed in a building constructed of roughly dressed, native granite masonry, neatly pointed inside and out, the openings for door and windows being finished in brick as an economical measure tending to lessen the otherwise massive effect. The roof trusses are of pine and the roof of surfaced tongue and groove lumber covered with Elaterite.

The building is seventy-two feet in length and twenty-eight feet wide, spanned by a ten-ton traveling crane, built and erected by the Cyclops Iron Works of San Francisco. The clear span of the crane is twenty-nine feet between track centers and the head room occupied above the track is only three and one-half feet.

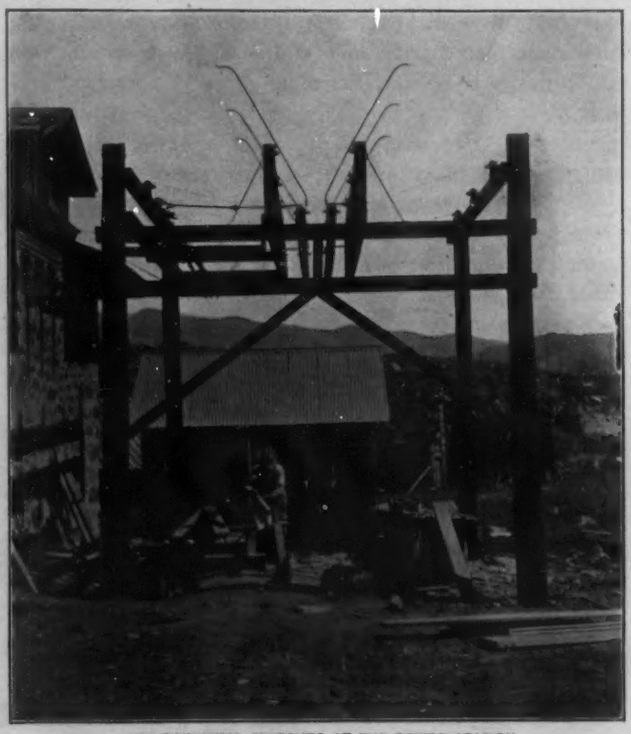
During construction, in order to expedite the installation of machinery, it became necessary to subject the crane to a load slightly in excess of sixteen tons, which was moved with no more apparent effort than required for its nominal load.

The foundations and floor of the building are of concrete, in which are laid pipe connections and the sewer-tile ducts containing the cables and other wires between the generators, exciter units and switch board as well as the cables from the switchboard to the transformer building, located thirty feet east of the power station.

All woodwork within the station is painted white and the interior is lighted at night with incandescent lamps at short intervals beneath the crane track and cross ties of the roof trusses. The side and ceiling lights are controlled by separate switches and may be fed from either one of the exciters or from the alternating current bus-bars, through a lowering transformer. The expanse of white ceiling above the incandescents produces a light which is clear and soft over the entire building and at the same time free from shadows or glare. Outlets are provided at convenient points along the walls for the insertion of portable lights for close inspection of the machinery.

The switchboard floor is raised six inches above the main floor and supported over a vault by arches sprung between I beams. The cables and all other wiring are led into the vault through the ducts and thence upward through floor insulators or tubes to the back of the switchboard. Transformers for lighting and induction motors on the exciter units are installed beneath the switchboard floor and the remaining space in the vault is used for storage of supplies.

Two main generating units are installed, each consisting of a seven hundred and fifty kilowatt Stanley generator, connected to a "New American" turbine by means of a leather link coupling. One of the generators is placed between the two turbines and has its shaft, extended on both ends, fitted with couplings so that it may be driven from either turbine. Normally each generator is driven by its separate turbine but by means of the arrangement just described, it is possible to connect all



HIGH POTENTIAL SWITCHES AT THE POWER STATION

four machines together and to keep at least half the capacity of the plant in operation under almost any conditions.

The generators are of the Stanley, three phase, rotating field type, generating current at 2300 volts. This class of machine is too well known to need description and it is sufficient to note that the usual liberal design of bearings is evident, while the operation of the generators has in every way fulfilled all expectations from the very start.

The turbines in the Washoe Plant are a product well known in the East but up to the present time rather new to this Coast and for this reason warrant a more extended description.

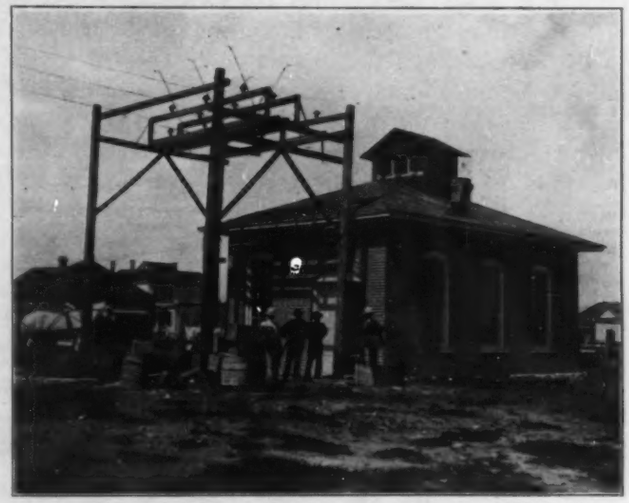
They are of the Francis type and were constructed by the Dayton Globe Iron Works of Dayton, Ohio. There are two pairs of thirty-inch runners set in opposite ends of a heavy sheet steel riveted case with ribbed ends arranged with stuffing glands, so that by removing the bolts, the runner and chute case are exposed for cleaning, repairs or replacements. The wheels are center discharging and are mounted at each end of the main gates while the shaft is made large in diameter in order to avoid any bearing in the water compartment. The housings are supported on a cast iron base frame, heavily ribbed to relieve the gates of any strains which would tend to distort the shaft and for the purpose of securing even running of the turbine.

The inlet thimble for each turbine is five and one-half feet in diameter and the draft tube five feet, two inches in diameter at the top and six feet two inches at the bottom, containing two elbows, one of ninety degrees and one of forty-five degrees, making a total draft tube length of about forty-eight feet and a distance from the center line of the shaft to the tail water of nineteen feet. The gate mechanism is designed so as to eliminate torsional strains in the parts, which are under tension or compression only, thus securing more accurate regulation than is obtainable where the gate shaft rotates. Wicket gates are provided, each gate being operated from a milled slot in a heavy ring encircling the entire gate mechanism, thus securing synchronous operation of all the gates. A pressure gauge and vacuum gauge are mounted on the housing of each turbine and a tachometer is fastened by a small frame over opposite bearings in such a way that all may be readily seen from the switchboard.

The governors are of the Sturgess, rotor, Type "E," oil pressure class—a new governor on this Coast, and one that has proven most satisfactory in its operation in this plant. It differs from many other governors in that instead of using a straight moving piston by which motion is transmitted to a pinion shaft through a rack and pinion, the piston itself rotates and may be direct connected to a pinion shaft, thus simplifying the gearing and reducing lost motion to a minimum. Although self contained, i. e., having oil reservoir and pump as part of its base, the governor occupies very little floor space. The peculiar form of fly-ball mechanism, similar to that adopted in all high speed, rotary engines, answers load changes more readily than does the mechanism ordinarily employed. The governor is extremely simple in its operation and contains all essential adjustments beside being fitted with a small motor for push-button control from the switchboard when synchronizing.

Two exciter units are installed in the station, each consisting of a twenty kilowatt continuous current generator mounted between and on the same base with a turbine and an induction motor. Each end of the generator shaft is extended and provided with a solid flange coupling.

In normal operation the generator is driven by the turbine while the induction motor floats on the main bus-bars. The operation of such an exciter set has frequently been described in the JOURNAL with special application to impulse wheels in which the nozzles are of very small diameter and therefore liable to stoppage or choking from debris. The turbines driving the exciters in this installation are very similar to the main units though of course many times smaller and the possibility exists of their becoming clogged with small twigs and leaves at



THE SUBSTATION IN SPARKS

fractional gate opening. The induction motors are not only of service in such an emergency but likewise serve in the place of water wheel governors to keep the speed of the exciters constant under any condition of load or gate opening. This is very necessary in order to realize the full advantage in regulation of alternating voltage derived from the use of the "T." "A" voltage regulator, which for its unqualified success depends in a large measure upon constant exciter speed.

The switchboard is of blue Vermont marble in four panels, one for the two exciters and their induction motors, two generator panels and one double transformer or load panel, arranged in the order given. The equipment consists of the usual instruments together with a synchronizer and a Tirril voltage regulator mounted at the side of the exciter panel. In place of the usual twenty three hundred volt switches, three pole, oil break, time limit, overload circuit breakers are installed on the generator and load panels, while the bus-bars and switches are so arranged that either exciter may be used for sup-

plying field current to either or both alternating current generators or the exciters may be operated in multiple.

The transformer equipment at the generating station consists, at the present time, of three, three-hundred kilowatt Stanley transformers, oil insulated and water cooled, raising the generated pressure at twenty-three hundred volts to the line potential of twenty-two thousand volts. The transformers are installed in a separate building also of masonry and providing space for an additional bank of three more of the same capacity. Pressure water for cooling purposes, fire service, etc., is furnished from a four-inch pipe leading out of the steel cross-connection between the main pipe lines.

In the same building are also installed one hundred and twenty Stanley lightning arresters, arranged in three groups of forty each. The arresters are mounted on vertical supports of two by fours supported on high-tension insulators and pins, each group being entirely insulated from the others. The choke coils are supported by a frame above the arresters and thence the outgoing line passes through openings in the wall of the building to the high potential switches outside. These switches are a modification of a type known as a ram's-horn switch and are intended for emergency use. They possess the advantage of extreme simplicity and durability in exposure to the weather and may be adjusted to break the circuit at any voltage in common use with transmission plants. The three pole switch consists of vertical brass rods mounted on insulators and secured thereto by lugs cast on brass caps fitting snugly to the top of the insulator. There are two rods for each break, branching from a short gap at the bottom to a wide space at the top and the switch is closed or opened by means of horizontal brass rods or plungers sliding in tubes secured to the horns or branching rods. The sliding rods are supported on insulators mounted on pins secured by special castings to a common shaft which is rocked by a lever, a forward motion of the lever rocking the shaft in an anti-clockwise direction and withdrawing the three plunger rods from their respective tubes, thus breaking the curcuit. The following arc rises, due to its own heat, and breaks across the horns when sufficiently attenuated. Adjustments are provided for lengthening or shortening the gap between the horns. A reverse motion of the lever accomplishes the opposite result, completing the circuit. Flexible joints are provided in the plungers since the movement imparted to the insulators supporting their ends is through the arc of a circle and the portion of the plunger making and breaking the curcuit moves in a right line. The lever is operated from ropes led into the building through suitable pulleys, and the ropes are designated by handles of different color.

All machinery for the power station was delivered on a spur track from the main line of the Central Pacific, loaded by a derrick onto logging trucks and hauled across the river over the Power Company's bridge to the building, a distance of a quarter of a mile, where each piece, with the exception of the transformers, was handled by the crane.

The transmission line consists of one three phase circuit of number four bare copper, supported on Locke, "No. 408A," two-piece, porcelain insulators, spaced thirty-six inches apart, the top insulator being carried on the pole and the other two on a cross arm. On all angles and long spans double arms are used and at the top of the pole the pins are set in short blocks. The arms are of Oregon pine, dipped twice in pure boiled linseed oil, and are through bolted to the poles in gains and supported by iron braces.

The pins are of eucalyptus and were treated by boiling in oil. The top pin is provided with an extra long shank and all pins are driven home and secured with wire nails.

The poles are of round Washington cedar, spaced approximately one hundred and twenty-five feet apart, thirty feet in length in the country and either forty-five or fifty feet long within the city limits of Reno and Sparks. All poles are roofed and painted at the tops and gains. The tops are encircled with steel bands, one and one-half inches in width and one-eighth inch thick, secured by driving on and nailing.

The telephone circuit is of number twelve (Birmingham gauge), iron wire supported on Locke "Number six" porcelain telephone insulators and brackets and connects the power station with the Company's offices and sub-stations in Reno and Sparks. The telephone line is transposed between every fifth and sixth pole while the transmission line is spiraled three times between the station and Reno and twice between Reno and Sparks. The line follows an almost direct course to the sub-station, located in the heart of the business and hotel district of Reno, where it enters the building through two sets of high potential switches, duplicates of the set at the power station, and so arranged that either the Reno sub-station or the continuation of the line to Sparks may be operated independent of the other.

Three two hundred and fifty kilowatt transformers of the oil-insulated, water-cooled type are installed in the sub-station, reducing the line voltage to from two thousand to twenty-five hundred volts by means of ten-step, regulator heads. A distributing switchboard and lightning protection complete the equipment. Cooling water for the transformers is supplied from a well by means of small centrifugal pump, driven by a Wagner single phase motor, arranged for pumping either directly into the pipes and coils of the cooling system or into a tank, from which the supply may be temporarily drawn in case of accident to the pumping machinery.

The transformers here as well as at the station and at Sparks are delta connected but arranged for Y connections should it be desired later to increase the voltage on the transmission line.

Three, three-phase distributing circuits leave the sub-station and are carried with various branches on forty-five and fifty foot poles over the greater portion of the city. The poles in town are all painted white with black trimming, and since they happen to be a particularly straight and uniform grade, they present an unusually neat appearance.

One two-pin and one six-pin arm are placed on the distributing poles and one wire of the three-phase circuit is carried on top of the poles. The insulators used for the distributing circuits are Locke "Number 45" brown porcelain and the pins are of eucalyptus.

The sub-station equipment at Sparks is a duplicate of that at Reno except that there are installed at the present time three one hundred and twenty-five kilowatt transformers with room for three additional when required. No regulator heads are provided here.

Both sub-station buildings are of brick with wooden trusses and roof. A small wire tower is built above the roof of each for convenience in bringing in the high tension wires, and the high tension bus-bars are run on supports directly over the transformers. The Sparks sub-station is also provided with high tension switches of the design described above.

The plant was placed in commercial operation on the evening of May 30, 1905, and a number of large customers were immediately taken on. This was the signal for which the Reno Power, Light and Water Company had been waiting and a reduction of seventy-five per cent in their rates was at once announced. The Washoe Power and Development Company, meantime, had not been idle, but for several months in advance had been quietly busy securing contracts on reasonable terms, both on meter and flat rate basis. They refused to alter their schedule in any particular and the quality of their service won for them many customers in spite of the cut made by their competitors.

Keen competition ensued, but in these enlightened days the policy of corporations is tending toward prosperous peace rather than toward rate wars, and the natural sequel was the consolidation of the Reno Power, Light and Water Company, the Washoe Power and Development Company, the Hunter Creek Water Company, and the Washoe Deep Well Company under the name of the Union Light and Water Company.

The new Company was incorporated early in September, 1905, with a capital stock of two million dollars by Mortimer Fleishhacker, John E. Humphrey, Joseph Martin, Richard Kirman, F. H. Buck, R. E. Wallace and H. A. Cooke.

Since the merger, the Washoe plant his been operated in parallel with the Floriston plant of the Truckee River General Electric Company, which supplies power and light to the mines on the Comstock, at Virginia City. The connection between the two plants was very readily established since the transmission line to Virginia City passes within a few hundred yards of the Washoe power station and is also connected by a branch line to the Reno Power, Light and Water Company's plant.

With the exception of the dam, ditch, and flume, the Washoe Power and Development Company's installation was designed by Cory, Meredith & Allen, consulting engineers, of San Francisco, Cal., who also supervised the entire construction of the plant.

—By WYATT H. ALLEN.

TELEPHONE ENGINEERING IN "THE COUNTRY GOD FORGOT."

MENTALLY resolving that there must be at least eight or nine hundred of them, the engineer in charge of Telephone Construction Reclamation Service, U. S. G. S., Tonto Basin Project, rolled off his cot at four o'clock one crisp morning and cautiously poked his head through the tent flaps and looked down the gentle slope that merged into a sand flat and on to the curving sweep and subdued purr of the Salt River.

The clear Arizona moon silhouetted the scene in startling lights and shadows and across the river the black profile of the hills showed clean-cut and with a fierce suggestion of aggressiveness. There in the middle of the sand flat two lonely coyotes were chasing their tails in the moonlight and yap yapping more different kinds of noises at one and the same time than nature ever intended two animals to produce. Here was game—real live game—and quietly reaching back for that brand-new Colts forty-five, the now thoroughly awakened Engineer stepped out of the tent and in a moment the hills echoed and re-echoed the six sharp reports; the coyotes dissolved into thin air, the hunter suddenly remembered his bare feet and was this not a land of rattlesnakes, tarantulas, centipedes, Gila Monsters, scorpions?—b-r-r-r!—a jump, a roll in his blankets and the Engineer drowsed off to sleep again to the accompaniment of an eloquent and emphatic dissertation by a Government packer in the next tent, on the pedigree and brain capacity of any "idjit who would deliberately waste good powder on a couple of measly, mangy, yellow-bellied coyotes." Thus are our illusions shattered.

Fresh from the East, self sufficiently full of the rule and precedent of the text books, ready with a slide rule and a formula for any problem, feeling an inward contempt for the triviality of the job, even mentally criticising the fool Government for wanting to survey a line so self-evident in its simplicity, the journey into Phoenix had been across a desert monotonous in its level, sun-broiled stretches, this construction man had somewhat unenthusiastically reported to the Supervising Engineer at his office in Phoenix, Arizona, to take charge of the survey and construction of the long distance Government telephone line to be built from the Arizona Dam to the Tonto Basin and the Upper Dam.

Long distance, mind you! eighty-six miserable little miles. Why! it was a shame to take the money!

Now given a Pullman car, a magazine, a fragrant cigar, ice water at your hand and Scotch and soda in the buffet, and eighty-six miles is a pleasant incident; given a devilish-tempered hill pony, a cow puncher's saddle, a broiling sun, a rough, wild Indian trail, an occasional sip of hot, salty water, and eighty-six miles is plain unvarnished Hades.

The instructions of the Supervising Engineer were brief and to the point. The Government had given a contract to Jas. P. Thorpe of Denver, Colorado, to build the entire line under Government supervision and along a route to be surveyed and staked out by the U. S. G. S. Engineers.

The contract was made up in four sections at so much per mile for each section; the first section from the Arizona Dam to what was termed Stewart's Ranch, twenty miles, the second section from Stewart's Ranch to Fish Creek, about twenty-three miles, the third from Fish Creek to Tonto Basin Dam Site, twenty miles, and from the Dam Site to the upper Salt River Dam the fourth section twenty-three miles. The line was to be full metallic of No. 12 E. B. B., 18-inch cross arms, transposed four times to the mile and the specifications to be test stations, and outside of these general conditions the Engineer in Charge must work out his own salvation. The Supervising Engineer further stated that Wm. A. Farish, Assistant Engineer, U. S. G. S., was then in camp at Stewart's Ranch and that on reporting to him a surveying crew and camping outfit would be provided for the Telephone Engineer, and also that Mr. Apgar, who would act as Transit man on the survey, was in Phoenix, and it might be advisable to see him and get some information as to personal outfit, etc.

"ACROSS THE RIVER THE BLACK PROFILE OF THE HILLS SHOWED CLEAN-CUT AND WITH A FIERCE SUGGESTION OF AGGRESSIVENESS"

called for thirty-five poles to the mile, "as near as possible," and as it proved this last was a wise qualification, for it was not near and it was not possible.

From the Arizona Dam to the Tonto Basin, the contract provided for iron poles, poles to be furnished by the Contractor, and an interview with Mr. Thorpe brought forth the fact that he had bought up all the old two-inch, two and one-half-inch and three-inch boiler flues in several States and Territories, principally from the railroads, and that they would range from twelve feet to sixteen feet in length. From the Tonto Basin to the Upper Dam Site it was to be a wooden pole line, poles to be furnished and laid at the stakes by the Government.

Stromberg-Carlson Telephones had been agreed upon and there were to be ten stations, and four of these were

Mr. Apgar was hunted up and interviewed with the result that that same evening found the Engineer on the train headed for Mesa, Arizona, clad in khaki, leggings, rough-rider hat, with a roll of blankets and a folding cot, a canvas war bag, and the hereinbefore mentioned Colts forty-five and bristling with a cartridge belt and holster.

Picturesque, possibly? a bit uncomfortable, decidedly.

His new spurs jingled merrily, and interhooked occasionally; he had not yet learned the trick of throwing the gun a bit forward as he sat down and consequently sat down on it and felt himself growing consciously red under the inquiring scrutiny of other khaki clad, gun-bedecked gentlemen whose rather frankly amused glances plainly marked him new, brand new, and he mentally

BOILER FLUE CEMENTED INTO THE ROCK

resented it by reason of still being veneered with a thin coating of Eastern superiority.

The transit man, Mr. Apgar, was not inclined to be particularly communicative but the Engineer managed to elicit the information that Stewart's Ranch lay on Salt River, thirty miles from Mesa, and that it was the end of the wagon road and incidentally of civilization. Further they would find at Mesa a wagon, in for a load of hay for the camp and that by starting at five in the morning and with good luck they would reach camp at about ten in the evening.

A surprisingly clean bed, a good night's sleep and at five the next morning the Engineer and his little party augmented by another young man, fresh from the Boston School of Technology, and who reported as Assistant Engineer, perched high on a load of baled hay, drawn by six black, wiry Government mules and listened to the pure Arizonic Vernacular of the packer, as he admonished a fractious leader that he had "better be gettin' purty gentle now!"

Hour after hour they hiked across the burning sands of the Salt River Valley; hour after hour they watched with hot, aching eyes the thin brown line of the hills which were their destination, and they seemingly made no progress. At one o'clock they came to the first river ford and as the wagon stopped, to let the tired mules drink, the Boston boy leaned over and scooped up a tin cupful of water and started to drink it eagerly, and as eagerly spat it out.

"Why? the —— stuff is as salty as ——!"

The old packer stopped in his cigarette rolling and solemnly said:

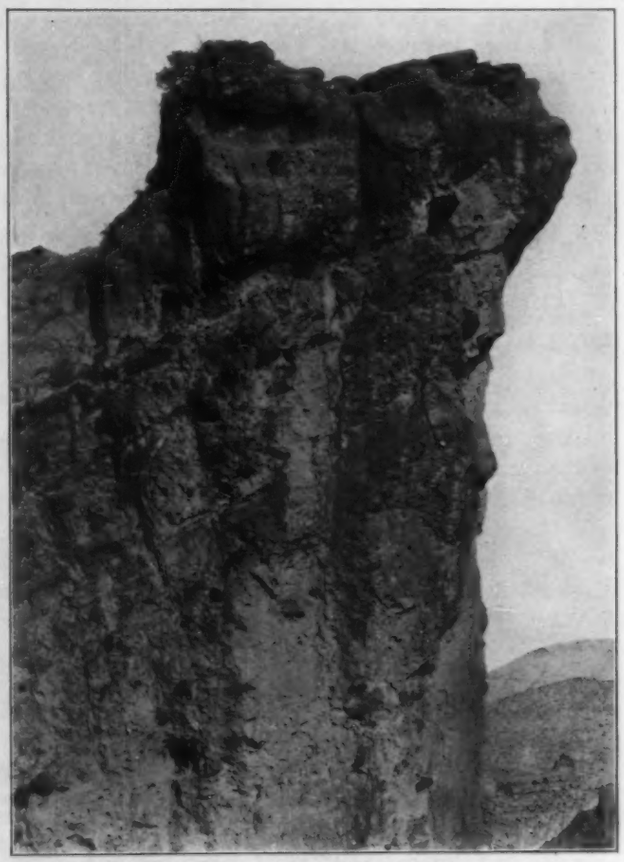
"Son, if yu stick to this yer job long I reckon yu'll see the time when yu'll be willin' to swap everything yu got fer one swaller of thet salty stuff."

And it was even so.

Lunch was eaten, hard boiled eggs, canned corned beef, rye bread and a slab of pie, washed down with cold coffee and the journey was resumed, through the long scorching afternoon.

The descending sun bathed the now fast approaching hills with burnished gold, deep tintings of red and royal purples, a subtle change was in the very atmosphere, the rapid babbling of the river seemed gently hushed, the call of the quail turned softer in its tone, all this wild land seemed to throw away its fierceness for the moment to pronounce its benediction upon the departing day. Now the golds, reds and purples changed to somber browns and grays and night fell with that sudden finality which, in this Arizona land, marks the transition from day to night, the black, whispering, mysterious night of the hills.

The wagon racked and strained into the shadows and the Engineer, turning up his coat collar against the little nipping breeze, suddenly felt himself possessed of a curious feeling of impotent helplessness, his assertiveness and superiority gradually oozing out at his finger tips, here was something intangible and uncertain, something be-



A SPAN SITE 4000 FEET LONG AND 1200 FEET SHEER DOWN

TEST STATION DURING CONSTRUCTION

yond human learning and knowledge and as Nature asserted itself he went to sleep, high up on that load of Government hay, looking back on the bright, sun-kissed day as a dream, gone forever, they would go on and on, swallowed up in this irresistible, inky blackness; some other Engineer would have to build the telephone line, they were lost— lo—.

"Yu better be gittin purty gentle now—whoa! yu Jinny mule! I'll jist naterally beat yer cussed head off!"

The wagon stopped with a complaining whine. A line of tents tinged to a ruddy glow by a roaring camp fire, the joyous yelp of a dog snapping at the Jinny mule's head, a dozen welcoming hands and more welcome voices in greeting, an introduction to Dutch Jake, the cook, which resulted in hot coffee and a square meal and the Engineer joined the husky fellows at the camp fire, and as he rolled his cigarette he inwardly observed, "We were lost and we are found again, I wonder who, in the name of all that's good, found us?"

Assigned to a tent, his cot unlimbered, and rolled in his blankets, he slept as only those sleep who are dead weary and who can breathe deep into their lungs the pure vitalizing air of the hills; the episode of the coyotes, and an hour later the cook's hearty call for breakfast, the Engineer hastily dressed and stepped out into the clear, bright morning and looked upon a new, unconquered world and as he looked right then and there he began to shed his rule and text, his precedent and his superiority.

Gone were the flat level stretches of the desert.

Gone were his 150 feet spans and standard construction.

The camp lay on a little flat on the river bank, called a ranch out of courtesy to a brush corral, where the cattlemen at certain seasons held their round-ups, completely surrounding them were mighty walls of solid granite, seemingly inaccessible peaks, jagged and frowning, Nature's heroic architecture in its roughest mood.

And they were sending puny, insignificant men here to build roads and dams, telephone lines and power houses, by what miracle the mules had found their way in the pitch darkness last night into this fearful upheaval of rocks was beyond the Engineer.

Here was a work that needed just three things, indefatigable labor, persistent determination and a large crop of common horse sense.

It was a meek and thoughtful Engineer that wended his way to the mess tent and a breakfast of bacon, beans and coffee.

There was no question this was the end of the wagon road and civilization.

Space forbids a detailed story of that survey. From the Arizona Dam to Stewart's Ranch it was comparatively easy; from Stewart's Ranch on to Tonto the way was strewn with what at times seemed insurmountable difficulties, deep wide river crossings, forbidding, rocky canyons; Nature made a protest at every step to the invasion of her stronghold.

LONG SPAN CONSTRUCTION

"A LAND OF RATTLESNAKES, TARANTULAS, CENTIPEDES, GILA MONSTERS, SCORPIONS"

Days of scrambling over the rocks, locating and relocating, it was a favorite saying of the Transit man that the Engineer would stand at the bottom of a gorge and heave a rock up the mountain side and say:

"Mr. Apgar, you will place your instrument about there and find out, if you can, where in blazes we are at."

And to the Transit man's credit be it said, he managed usually to get a set in spite of the danger or difficulty. Spans of 800, 1000, 1500 feet were every-day incidents, and often the crew would be laid off for three or four days while the Engineer and a companion would painstakingly hike over the hills trying to locate a mile or so of line that seemed totally impossible, for the Contractor had to be considered, and the Salt River floods and the line rider who would maintain this line after completion.

Profile and traverse were made up in camp, or what passed for a camp, for after Stewart's Ranch the scarcity of water for animals made it impossible to carry anything but blankets and food and a portion of the time drinking water was packed in to the crew on a mule's back in kegs, and bacon and beans and black coffee were the daily portions.

Another surveying crew, under H. D. Stone, was started at the upper dam to work down the river to Roosevelt and this entailed a weekly trip by the Engineer, on horseback, of from fifty to sixty miles of unspeakable trail, to overlook the work at that end. Here the conditions were entirely different but none the less difficult. This section was made up of wild rolling sand-hills, barren of everything except cactus and mesquite brush, cut into by enormous washes—and span after span of 600, 700 and 800 feet was necessary.

The two surveying crews met one day in a sand wash about eighteen miles from Tonto and straight way erected a pole on the site of the last stake and some one contributed a red shirt to hang thereon and for many a day that red flannel rag boldly flung its lurid color to the winds to commemorate the finish of the survey of the telephone line to Tonto Basin.

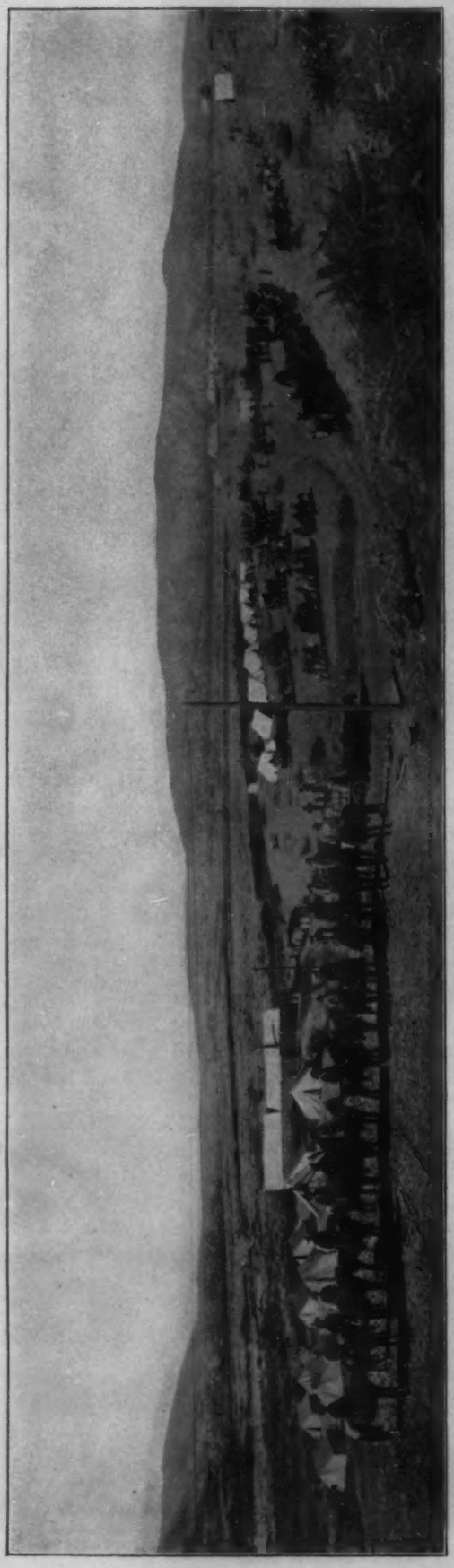
The surveying crews and Mr. Stone reported to headquarters for other work and the Engineer turned his pony's head towards Stewart's Ranch again to act as Inspector for the Government in the actual construction of the line.

The Contractor and his Superintendent, George P. Brown, and a first installment of about fifty men were found camped at a Mexican goat ranch about ten miles below Stewart's Ranch with a portable blacksmith outfit, material for thirty miles of line, about one hundred burros and a so-called portable power drill guaranteed to drill a four-inch hole twenty-four inches into solid rock in sixteen minutes with four men. This contrivance weighed some 950 pounds, but a trip to Stewart's Ranch over the staked line convinced Mr. Brown that it would take longer to pack the drill, if it were feasible at all, than it would be to use hand drills and it was sent back to Phoenix.

The work of transporting material, men, tools, provisions and water through the hills was a formidable task but the details were laid out to a nicety, and through Mr. Brown's executive ability and ingenuity every difficulty was promptly disposed of without loss of time or material.

The boiler flues were heated and flattened on one end and punched with two bolt holes and the cross arm bolted on, the butt of the pole was then dipped in hot asphaltum for two feet of its length and allowed to cool and harden.

"WILD, ROLLING SAND HILLS, BARREN OF EVERYTHING EXCEPT CACTI AND MESQUITE BRUSH"



HEADQUARTERS CAMP AT ROOSEVELT A. T. U. S. G. S. ENGINEERS IN FOREGROUND

The pole was then set one-tenth of its length in cement, mixed about half and half.

The long span construction was made up of two three-inch tubes, set side by side six feet apart, with two cross arms bolted on with U bolts. The span wires were three-eighths inch galvanized steel strand, one taken across the top cross arm and one on the bottom arm resting on iron saddles, screwed to the arm and directly back to five-eighths inch by eight-foot guy rods cemented into the rock, each strand was broken into at each end on the span side with a Brooklyn Giant Strand. The line wires were brought to the glass insulators on the lower cross arm and looped around the strain insulator and soldered to the steel strand. Each pole was back guyed with one-half inch strand to guy rods cemented into the rocks. The wooden towers were practically the same except that the poles were gained and the cross arms lagged on.

The Government was building a road through the hills and orders were received that in each case, where the telephone line crossed the road stakes, the wires must be sixteen feet from the ground. This order caused consternation in the construction camp. There was nothing over a sixteen-foot tube on the ground. There was no method of satisfactorily welding them, but there was the order and it had to be done and a consultation of all the wise men in the different crews was called.

A plan shown in the illustration was finally adopted and worked out. A sixteen-foot three-inch tube was taken and a wooden plug inserted in the butt. The tube was set and filled and packed with sand to within four feet of the top and an inch of cement was run on top of the sand. A two and one-half-inch tube was then cut to the proper length; the cross arm bolted on, and the tube slipped into the three-inch flue and run around with cement to the top. When the cement set there was a good solid job of splicing.

This line stands unique, due to the almost inaccessible character of the country through which it runs, and great credit is due to James P. Thorpe, the Contractor, and his Superintendent, George P. Brown, for the efficient manner in which the contract was carried out and the courtesy and promptness with which they met every suggestion made by the Government Engineers.

The line after completion was remarkably quiet and efficient in transmission and remained so for a week or ten days. At the end of that time the Engineer rode into Headquarters camp and was asked what had gone wrong? They could not get the Arizona Dam. There was an awful buzzing and rattling, and it had been so for twenty-four hours. It was O. K. on the Upper Dam section. The trouble was down the river; the Engineer tested several times and each time the rattling was seemingly louder. Finally the line rider was called in and told to saddle up and hike down the trail and clear the trouble.

The line rider was known as "Slim," a long, lean

Arizonian, preternaturally solemn, picturesque and characteristic in speech. In three or four hours the trouble cleared up and "Slim" was looked for to explain the cause. About nine o'clock that night "Slim" came gangling into the Engineer's tent and folded himself up on a box and carefully rolled a cigarette, cocking his eye up at the Engineer, he cautiously delivered himself.

"I reckon I shot up thet trouble some,"

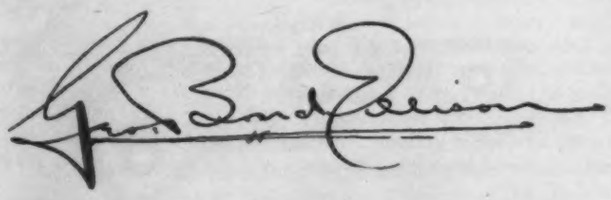
He was asked to explain.

"Wa-al, yu see, I hiked down the trail fer about twenty miles and didn't find nuthin', everything clear. Sa-ay! yu know where the line goes down in the holler at Fish Creek? I got round that pint of rock and looked down at thet pole. Yu know it's a transpersition! There was a big, red-eyed, long-horned steer just a bellerin' and pawin' up the ground all around and kinder lookin' up. I rid closter to get wise and dang my buttons! ef there wan't a six foot rattler, head end wound three times around one wire and tail end three times round t'other and the little ole rattlers stickin' right up. Wa-al, I jist naterally figgered it out this here way, that steer had caught Mr. Rattler and histed him up on the wires and was a waitin' fur him to fall off. Mr. Rattler was jest naterally scared plum stiff and every time we took down the receiver and rung up we'd shoot the juice through him and he was hangin' there jist rattlin' like h—l for help!"

"Slim" went on to say that he was so impressed by the reptile's intelligence that he had killed the steer and turned the snake loose in the hills.

The writer in closing wishes to pay a slight tribute to a class of men too often misunderstood, too often maligned—the Engineers of the Reclamation Service, U. S. G. S.—the men who are working to reclaim the arid lands, intrepid, resourceful, knowing no such word as fail, who do their work under the most trying and heart-breaking conditions; the men who build roads where Nature never intended a road to be, who plan canals, dams, power houses in the heart of the wilderness and do it uncomplainingly, who with all the wildness of the life remain courteous, considerate, gentlemen. To these men the writer most respectfully takes off his hat.

And to you who have never tasted the free life of the hills, or known them in their irresistible power and fascination—try it once, live it until it becomes inoculated into your system and you will then understand its charm—the weird charm of Arizona, the "Country God Forgot."



THE ELECTRICAL ENGINEERING FEATURES OF THE LEWIS AND CLARK CENTENNIAL EXPOSITION.*

IN selecting the general illumination scheme for the Exposition, much had to go along regular lines such as following the outlines of buildings, which is perhaps as stereotyped now as it will ever be, and the carrying out of a plan for the illumination of the grounds, esplanades and bridge.

In the park illumination the general divergence from the ordinary scheme is the wiring in among trees on a large scale. This has perhaps been done in a small way at other places, but I think this is one of the largest attempts at park illumination that has been carried out, where we illuminate about twenty acres in area. The illumination of the park is with eight- sixteen- and twenty-four-candle power frosted lamps, at intervals about the grounds. We had to be governed absolutely by the shrubbery and trees in placing these lights, putting in lamps of such candle power as would cover the area to be lighted and give a uniform distribution of light. The Sunken Gardens, Grand Stairway and Bridge of Nations and roads of the grounds are illuminated with six and twenty-seven light electroliers 100 twenty-seven light electroliers and 400 six light electroliers being used. In these electroliers we have used what is known as the meridian lamp. One of the reasons for using this lamp is that it adds to the general appearance, as well as to give a general diffusion of light. The use of frosted lamps all over the grounds was for this reason; that a lamp with the ordinary filament would be painful to the eye and a fine diffusion of light would not be obtained, especially in the park among the green foliage, and its silvery effect would also not be obtained. I believe, considering the decorative features obtained from the use of frosted lamps, that the extra expense was justified. Of course we have a few searchlights about the grounds. I look upon the use of them like we do upon red lemonade at a circus—a circus is not considered complete without red lemonade. So the explanation of their use is from that standpoint. They produce a good novel effect at times, though also a good many annoyances, which are unavoidable, but they are a part of the business. A small amount of submarine illumination has been attempted, and it has been given up. We planned a large amount, but there is a great amount of organic matter in Guilds Lake at the present time and the submarine illumination has not been successful on account of the inability to place the lamps at a sufficient depth in the lake to get the diffusion effect. Last winter we submerged these lamps five and six feet and the effect was fine, and it was designed to carry it out on a large scale; at the present time, however, we are obliged to bring our lamps up to within about sixteen to twenty inches of the surface of the water, and the result is the

*A paper read before the Electrical Transmission section of the Pacific Coast Engineering Congress, held at the "American Inn" under the auspices of the Lewis and Clark Centennial Exposition, Portland, Or., June 29-30, 1905.

filament of the lamp is plainly shown and all of the decorative effect and the effusive effect in the water is lost; besides there is shown the organic matter that is in the lake.

In the matter of the supply of current, we obtain our current from the Portland General Electric Company, 2200 volts, 33 cycle alternating current, and 550 volts direct current. In the distribution we have the 500-volt direct current for power. We also have a small amount of 110-volt direct current, which we transform from motor generators placed at various parts of the grounds for stereopticon machines and fan motors and other small apparatus. To keep down expenses, which is one of the first things in Exposition work (that is the cost of installation), we have adopted one or two schemes I think worth mentioning. We have about six miles of underground construction, using the common weatherproof wire placed in wooden troughs, on small porcelain knobs, running through the grounds. The only thing required is perfect drainage, and this we have taken great pains to obtain; sometimes one of these troughs will be running full of water, serving as a gutter, but we have not had any trouble from this as yet. We have about two miles of high tension wire underground, and this is carried out in about the same manner, except the troughs are twelve inches square inside. The conductors, usually 4-0 carrying either 2200 volts or 500 volts direct current, are supported on insulators placed about twelve feet apart. Some of these troughs are buried from eighteen inches to three feet below the ground. We have had this service in operation for about a year and up to the present time we have had no trouble at all with it, except in one case where a landslide shoved out some of the troughs. It makes a very cheap method of placing wire underground and the salvage is very high and in this country, there is little use or sale for cables, and after the Exposition is over, the copper wire can be easily drawn out with a span of horses. That is the reason for having 110 volts, 2200 volts and 500 volts service in this underground construction. The other part of the construction is overhead, regular pole construction, and owing to the shape of the grounds, we bring it around the outside and drop into transformer pits at frequent intervals. These transformer pits are holes dug alongside of the buildings, where we can obtain drainage, usually seven feet deep, provided with an oil sink under the transformer pit, and built of two- or three-inch lumber, and contain twenty-five to one hundred and fifty kilowatts capacity each. It has given us usually short secondary lines, and the leads of copper extend to a minimum usually within fifty feet, and one hundred and fifty feet is the longest secondary line that we have in any of the large buildings. The result is there are no large conductors used to any great extent on any of the work on the grounds.

In the wiring of buildings, we have kept to the standard of the Pacific Board of Underwriters' Rules. Our buildings are all wired with slow burning white wire absolutely. While there is a little more expense attached to it, the decorative scheme of lighting is augmented very much, as well as the day effect. No wire less than No. 12 B. & S. gauge is used. Our drop from the transformer to the lamp is about 3½ per cent, which I believe is quite a low drop for exposition work. The distribution of current is at 117 volts, two-wire system. One reason for the adoption of that system for the grounds, over the three-wire system, was that the secondary runs were so short, coupled with the freedom from grounds and other subsequent trouble. At times we have very heavy driving rains, and as yet we have not been troubled whatever with short circuits.

In the park wiring I do not suppose that there are over five hundred insulators used, on about 80,000 feet of wire. There are 5,000 lamps in the park of various sizes, eight- sixteen- and twenty-four-candle power. All of the wiring is done with rubber covered wire, tied on the branches of the trees, and as yet we have not had a single case of trouble. It would not do for permanent work, but it has saved large expense, and provides a great deal of neatness to the general park wiring scheme by eliminating insulators. For the same purpose, from these underground conduits which we have running through the park, of which there are about four miles in the park proper, we bring our wires from the boxes in pipes, using common iron pipe, being careful to have it smoothed and rounded on the ends where the conductor enters or leaves the pipe, using single braid rubber insulated wire for our pipes, and so far have not had a single case of trouble. In wiring of this park work, the question is not of first-class construction or the finest engineering plan possible, but to make it safe for the term of the Exposition. In this way we have been able to bring down the expense per lamp to a very low figure. The average cost for each lamp, counting the cost of the transformer pits, stands us less than 70 cents per lamp on any of the Exposition buildings proper; while on the Government Building, on account of long runs, I think it was about $2 per lamp. On the Government Building they had to use a great amount of cable, as theeir transformers were located at some distance from the building, and it brought up the expense very largely. With our buildings, we were enabled by reason, as I say, of these transformer pits being located close to them, to keep down the expense to a minimum figure.

—*By J. R. THOMPSON.*

California leads the world in long distance, high tension, transmission of electric power. A number of its pole lines are longer than any elsewhere in the world, one being 212 miles in length. The State also compares favorably with other states of the Union in the number of miles of railway lines, in the lumber products, manufactured from its vast forests, and the products of the mines and oil wells.

CALIFORNIA AT THE FAIR.

CALIFORNIA people have attended the Lewis and Clark Exposition at Portland very liberally. The golden yellow badge of California is seen everywhere and no one who stops at the Fair can fail to be impressed by the evident interest of California in her great northern sister State. Up to the middle of August 50,000 names were said to have been registered from California at the California Building and doubtless many Californians visited the Exposition who failed to register.

The interest which California has taken and with her customary vigor, as shown in the Exposition, has doubtless contributed materially to its great success. It has been a good thing for the Fair and it has been a good thing for California. It has brought the people of the entire coast region closer together; they have come to know and appreciate one another. In helping to bring about a sentiment of united feeling the Exposition has gone a step beyond the great work which must be done in showing to the people of all the world the resources and opportunities of the great Northwest. It has brought the Pacific states together as one great family.

The Lewis and Clark Exposition has received the cordial support of the press, not only of the entire Pacific Coast, but of the whole United States. The desire of the management of the Exposition has been that the press work will be conservative in bringing the people of the Pacific Coast closely together.

But a few weeks remain of the opportunity to visit this great Exposition. Yet in that time thousands of strangers will come to the Coast. When we who are so near but stop to consider the interest taken all over the country. The Northern Pacific alone daily carries thousand of people to Portland—we should appreciate our very advantage of position. Not only is it an opportunity to visit Oregon—it is a chance as well to carry thither California's tidings of prosperity and good will.

Co-operation is the watchword of progress on the Pacific Slope to-day. California has been benefitted materially by the flock of visitors to Portland. Records show that most of those from a distance either come or go via California, fulfilling an almost universal desire to see California.

The Exposition turnstiles have recorded a million visitors up to August 1st, and those familiar with expositions predict a total of 2,500,000 by October 15th. This remarkable showing indicates a true appreciation of the beauty of the Exposition's site and surroundings, of the compactness and picturesqueness of her buildings and grounds, of the varied character and worth of her displays especially those from the Pacific Coast.

Seeing these things, we know that the people of the Northwest may well be proud of their country, and we are ready to join them in conceding the Lewis and Clark Centennial Exposition to be the most successful undertaking of its kind ever held.

ELECTRIC DEVELOPMENTS.

IN reviewing the remarkable development of water power in the South for electrical transmission the *Manufacturers' Record*, of Baltimore, in a recent issue says:

"It is generally claimed, and doubtless correctly so, that at the present time the South leads the entire country in the number of water power electrical plants under construction and contemplation. Some of these are of great magnitude, rivaling in importance the largest electrical power transmission in the country with the exception of Niagara.

"Not far even behind the first electrical development of Niagara in the undertaking at Whitney, N. C., recently described in detail in the *Manufacturers' Record*, where Whitney & Stephenson, leading bankers of Pittsburg, and their associates are spending several million dollars in the development of a power which at the initial stage will furnish about 40,000 horsepower, to be followed later on by an additional development which will carry this to 76,000 horsepower.

"Exceeding even this in the aggregate of power to be developed is the project of the Southern Power Company, recently organized with a capital stock of $7,500,000, which has taken over the Catawaba Power Company, with office at Charlotte, N. C., and proposes to continue the development at other sites, all under one control, to an aggregate of 110,000 horsepower, to be transmitted for electrical work to points tributary to its various power plants. This enterprise, organized by Dr. W. Gill Wylie, of New York, is backed by a number of leading capitalists of that city and North Carolina, including the Dukes of the American Tobacco Company and others.

"Another extensive undertaking of this character is that of the Chattanooga and Tennessee River Power Company, which proposes to develop from 30,000 to 40,000 horsepower on the Tennessee River below Chattanooga. This company has a capital stock of $3,000,000. Colonel John Bogart, a well known engineer of New York, is in charge of the development work, and it is expected that plans will be completed in the near future and that construction will be pressed as rapidly as possible after contracts have been let."

MADISON SQUARE GARDEN ELECTRICAL SHOW.

SUBSTANTIAL progress is reported by the managers of the Madison Square Garden Electrical Show, and many new exhibitors have added their names to the already long list of concerns who have signed contracts for space at the garden. Among the exhibits being prepared and which are particularly noticeable is that of the Magneta Clock Company, of Zurich, Switzerland. This exhibit is bound to attract much attention, not only because of the interest that will naturally be aroused by a Swiss exhibit at a New York electrical show, but because of the many interesting features of their electrical time control which will be graphically illustrated by many sectional models.

The New York Telephone Company is busy perfecting plans to extend the scope of its exhibit, and besides the huge bell sign, studded with purple incandescent lights, and the model switchboard exhibit, it is now understood that the telephone people will add as a further attraction a line of theatre phones. The Vandyke-Churchill Company will make a very interesting exhibit, covering a widely assorted line of motor driven machine tools in actual operation, with machinists running each tool, thus giving a practical demonstration of their application.

Many other exhibits will be noted in later issues of this paper, and the prominence of the principal exhibitors is a surety of an exceedingly interesting exposition.

ELECTRIC POWER AND FUEL.

THE extent to which fuel oil and electric power are entering into manufacturing and all other development and producing enterprises is shown clearly by the reduction of coal imports at San Francisco. During the last four years these deliveries have been as follows: 1904, 1,051,072 tons; 1903, 1,215,554 tons; 1902, 1,445,598 tons; 1901, 1,834,785 tons.

During the same years the oil production has been as follows: 1904, 29,850,000 barrels; 1903, 23,602,000 barrels; 1902, 13,692,514 barrels; 1901, 8,654,500 barrels.

In a steam-producing capacity, it requires four barrels of oil to equal one ton of coal. In the four years receipts of coal have decreased 783,713 tons. This would be compensated for by 3,134,852 barrels of oil, but the oil production has increased 21,095,500 barrels, or nearly seven times the decrease of coal.

This illustrates in forcible terms a wonderful growth in industrial and manufacturing development of the State. In other words, the State never in its history imported as much as 1,900,000 tons of coal in a year. In 1904 the coal imports and oil production combined equaled 8,513,517 tons of coal, or considerably more than four times the available steam-producing power in 1904 than there was in 1901.

In 1904 there were 85,000 electrical horsepower in San Francisco, while in 1901 there was about 40,000 horsepower. Most of the electric power is generated in the Sierra Nevada Mountains, and delivered to this city by transmission wires.

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EDITORIAL.

PACIFIC COAST TRADE CONDITIONS.

Probably never before in the history of the Pacific Coast have the general trade conditions been as satisfactory and promising as they are at the present time. Electrical interests are particularly active, and in a great number of lines it is not a question of stimulating the demand, but one of obtaining a supply, and as far as we have been able to learn this same condition obtains in all the varied industries of this section.

The difficulty in securing prompt shipments from Eastern manufacturers is a serious problem on the Coast, and we are at times compelled to believe that our Eastern friends do not thoroughly appreciate the growing importance of their far Western business. There can be but one remedy for this condition, and that is earnest and concerted action by every jobber, agent and contractor on the Coast to impress upon the houses which they may represent or deal with that this Western business is a big business. They must impress upon them that we are a long ways from home, and that the carrying of large and complete stocks of all staple lines by their Coast representatives will be a profitable proposition.

We realize that we are not the only prosperous section of the country, and in a great many instances, possibly a majority, the factories are working night and day to keep up their orders, but the complaint of slow shipments is so universal on the entire Coast, from San Diego to Seattle, that we must conclude that we are too far in the perspective to be prominent in the Eastern factories photograph of the business world.

We are nearing the end of 1905, and the present outlook is that the beginning of 1906 will find our business interests looking back with satisfaction on the old year and its results then turning to the new year with the determination to make it a record breaker and another prosperous chapter in the book which will record the final fulfillment of the Pacific Coast's triumphant destiny.

COMMUNICATION AS A FACTOR IN THE DEVELOPMENT OF COMMUNITIES

Ambition treads on the heels of desire and necessity drives ambition to its end. Each and every community desires to grow and flourish in prosperity, and in this desire is bred ambition to do great things, and to do great things there arises the necessity for the means thereto, and in seeking these means ambition is driven to its end.

There are certain essentials necessary to the development of any community. The first and possibly the greatest essential is a spirit of intrepid progressiveness in its citizens, the spirit which knows no backward step, which stands with open arms to welcome each vibration which reaches it from the mighty onward march of civilization. The true, ambitious citizen, ambitious not only for himself but for the community in which he resides, seizes upon the means which civilization provides and uses them, not entirely for himself alone, but for the grand broad purpose of advancing the communities welfare.

Civilization has been unceasing in its demands upon the brains and inventive genius of man, and that these demands have been met, almost as soon as made is evidenced upon every side and in almost every section. Civilization demanded a better means of transportation than the saddle and the stage coach, and man produced the steam and electric railroads. Civilization demanded a better method of illumination than the tallow dip and the keresone lamp, and man produced the gas and electric light. Civilization demanded a quick means of communication, and man produced the telegraph, and ever clamoring for more, persistent in its onward march, it demanded an even more direct method of communication, and man produced the telephone—for civlization is man and that which man demands that must man produce.

The mighty volume of the world's business is carried on by communication, after this comes transportation, these two factors are the very essence of modern, civilized life, and the more rapid and direct the means adopted by which we communicate with our fellow man the more rapidly we progress.

The man upon the desert island cannot progress, no matter what the natural resources surrounding him may be, cut off from communication with his fellows if he does not retrogress he at least stands still, and the community which does not seize upon every means provided by civilization for rapid, accurate and direct communication becomes a community upon a desert island, retrogression or stagnation is their portion. The railroad, the postal service, the telegraph, the telephone—each mark a mile post on the road to a communities prosperity and welfare, and the prosperity of the community means the advancement of the individual. The

local and long distance telephone has been without question a most potent factor in the upbuilding and development of communities, its influence is felt in the snow clad hills and on the sun broiled desert, and the very fact that close to our hand is a means of direct communication with the world brings a sense of civilization and security, and on the day that all the world and its now segregated communities are in instant touch, individual to individual, that day we will have reached a high tide in our mental and moral development.

THE STREET RAILWAY AND ITS RELATION TO INTER-URBAN GROWTH.

The application of the electric current to the street railways of the country has opened up a new era for the man of moderate means; we can, with entire truth, express it more broadly, and say to every wage earner who desires a home of his own, and that means the great majority of the American people, for we are, as a Nation, home seekers and home builders; further it has made it possible for those who, for various reasons, are obliged to dwell in or near the congested city centers to quickly reach the open country with its sunshine and pure, fresh air, to at least semi-occasionally give their families an outing close to "Mother Nature" and to do it at a minimum expense.

But it is the small home builder who has been the greatest beneficiary of this quick, cheap transportation, and it is he who has made the inter-urban railway lines profitable business investments. The enterprising managers of such lines have worked hand in hand with the small home builder until these railways have become pulsing arteries through which flows, twice each day, the mighty tide of the wage earners. And it is these same wage earners who are at once the hope and the bone and sinew of our country, for every man who builds a home, no matter how small, irrespective as to the method whether cash or installment, immediately lays the foundation for a solid, substantial citizenship, gives to himself the best possible incentive for sobriety, decency and thrift.

In the average American city the rapid growth of business interests, the wave of municipal improvement and the consequent advances in real estate valuations, have made the acquiring of a home within a city's limits prohibitory to the man of small means, and before the advent of inter-urban railroads he paid his tithes in rentals and was prone to look upon a home of his own as an evanescent dream.

And we believe that in every franchise granted for inter-urban traffic there should be embodied the freight carrying clause, within certain well defined limits; not in the light of a competitor to the steam road, but as a matter of convenience to the small truck farm, the dairy man, the fruit grower and for the delivery of small parcels for the inter-urbanite. In our own State of California acre upon acre of barren lands have been redeemed nd have become the sites of hundreds of cosy homes, surrounded with gardens, flowers and trees, little vegetable and poultry ranches, which, in many instances, bring in an important addition to the family's monthly income. The clerk, the mechanic, the artisan no longer finds it necessary to herd his family into close ill ventilated tenements, for the inter-urban railway has put it within his power to find his own home, his own fireside, his "Castle;" his children need no longer be subjected to the temptation of the inner city life, for out there "beyond the walls" is the freshness of nature, the healthy, innocent pleasures which should come with childhood, uncontaminated by the city's life. And no nobler work has ever been conceived, no grander problem ever solved, than that which has brought health, happiness and independence to thousands of our fellows and those dependent upon them.

The critic here will interpose that it is sordid money getting that has induced the capitalist to invest his money, the manager to perfect these enterprises, the engineer to work out these problems .Friend, it may be so, but if their desire for money getting brings all this measure of good to numberless people, are they not entitled to this gain?

The street railway, sending out its feeders in every direction, is the direct cause of inter-urban growth, and inter-urban growth means prosperity and a competence to thousands otherwise denied.

The southern portion of California, notably the country immediately tributary to Los Angeles, is becoming one vast network of electric lines, and it is safe to say that nowhere in the world is better service rendered than in the section mentioned. Every detail of construction, operation and management has been worked out with scientific exactness, and the people of southern California may well add to their list of attractions their magnificent system of electric railways. We understand that extensions have been planned as far south as San Diego, and when these are completed they will offer one of the most beautiful and interesting trolly excursions in the world.

IN MEMORIAM.

JOHN I. SABIN, died October 10, 1905—San Francisco and the world at large loses one of its most earnest workers and strongest characters in the death of this masterful man. Ever a leader of men he leaves a memory which time cannot efface. The company which he founded, and of which he was the head at the time of his demise, bears the stamp of his powerful personality and will ever remain a fitting monument to his splendid business ability and untiring energy. Errors he may have made, but his errors never tainted his honor—loved by a host of friends, respected by those who opposed him, he passed away upholding to the end the ideals of those things which he thought were right.

John I. Sabin—to you we can but pay a passing tribute, to your pure, upright manhood, your sterling integrity and your undeniable sincerity of purpose.

Your work is done—Rest in peace.

PERSONAL.

Messrs. Arthur F. Salomon and G. F. Lawson, of the Nernst Lamp Company, left on the 28th of October for Los Angeles and Southern California points to reorganize the company's business in that section.

Mr. C. J. Corcoran, superintendent of construction Pacific States Telephone and Telegraph Company, returned to San Francisco October 12th, after an extended inspection of the company's work in the Washington and Oregon territory.

Mr. William Kettner has resigned his position as manager of the Visalia Gas Company and William K. Parker has succeeded to that position. The gas company will continue to occupy a part of Mr. Kettner's office in the Visalia Bank Building on Church Street.

Mr. William J. Barrett, Pacific Coast sales agent for the Wright Wire Company, has just returned to San Francisco from a ten days business trip. Mr. Barrett reports a very successful trip and also that the business totals for the month have been eminently satisfactory.

Mr. O. A. Stranahan, who joined the Allis-Chalmers Company last December as manager of the power department, has been promoted to the position of salesmanager, with headquarters at Milwaukee. M. C. Miller has been made assistant salesmanager, and will have charge of all matters in the sales department which do not require the personal attention of Mr. Stranahan.

Mr. T. K. Wells has been appointed superintendent of transportation of the Manila Electric Railway and Lighting Company, of Manila, P. I. Mr. Wells has had a wide experience in railroad work, having been with the Wabash Railroad and the St. Louis, Iron Mountain and Southern Railroad for fourteen years and with the Syracuse Rapid Transit Company for eight years. The Manila Electric Railway and Lighting Company is controlled and operated by J. G, White & Co., of New York.

Mr. W. T. McCaskey, until recently manager for Agar, Cross & Co., of London, and previously identified with the Edison, Westinghouse and other electrical interests, will hereafter act as special representative of the Allis-Chalmers Company in making estimates as to the equipment of inter-urban railroads, hydro-electric projects, etc. Mr. McCaskey is a native of Wisconsin, and began his electrical work in 1882 when he took charge of the plant of the Eau Clair Electric Light and Power Company.

Mr. Herbert Booth King, Portland, Or., northwestern advertising manager for THE JOURNAL OF ELECTRICITY, POWER AND GAS, is a recent arrival in San Francisco. This is Mr. King's first visit to the "big city" of the coast and his experience, so far, has simply served to confirm the fact that it is not only his own bailiwick which is suffering from an excess of prosperity but the entire Western country. Mr. King is combining business with pleasure, the pleasure, he assures us, is in visiting San Francisco, the business is principally in connection with the proposed special Northwestern Edition of THE JOURNAL, covering a complete, illustrated description of the electrical industry of the territory embraced by Washington and Oregon. In view of the enormous growth of things electrical in this section such an issue should prove interesting to everyone having the welfare of the lighting and power business at heart. Mr. King will remain in San Francisco for about ten days, when he expects to visit Los Angeles and the surrounding country.

The Buckeye Electric Company, of Cleveland, O., is sending out under the caption "Lamp Limericks," a handsome folder containing a number of more or less poetical stanzas, each pointing the moral "Better Buy Buckeyes."

RECLAMATION OF THE YUMA DESERT.

ONE of the most difficult irrigation undertakings of the present day is the proposition to transform 85,000 acres of the arid Yuma desert into fertile farming land. The United States Reclamation Service have awarded the contract for this work to J. G. White & Co., Inc.

The project presents almost insurmountable difficulties in many ways. The nearest town is the City of Yuma, located twelve miles down the Colorado River. Suitable drinking water is extremely scarce, and the summer temperature in the Yuma desert ranges from 100 to 120 degrees. A modern camp will be built, and will be controlled by special officers employed by the contractors, or by the Government policy of the Indian Reservation. It will be equipped with a complete refrigerating system to provide ice and cold storage.

The transportation difficulties will be overcome to a great extent by the use of a thirty-foot gasolene launch to run as an express boat between the dam and the City of Yuma. Barges and other floating equipment will be used to transport heavy supplies. At the dam will be located complete telephone and telegraph systems, so that constant communication may be had with the City of Yuma.

At a point where the Colorado River forms a dividing line between the State of California and the Territory of Arizona, a dam one mile long will be built across the river. It will extend completely across the valley, and will have a sluiceway at either end which will be connected with the main arteries of the system of irrigating canals. Under ordinary conditions the Colorado River at this point is about one quarter of a mile wide, but the flats on either side are frequently flooded by high water. This is especially the case during the early summer months when heavy floods are caused by melting snow in the mountains.

The contractors estimate that the work will require the removal of over 300,000 cubic yards of solid rock excavation, and 300,000 cubic yards of lighter material. The rock will afterwards be used for filling in the dam. The three vertical concrete core walls in the interior of the dam will require 30,000 cubic yards of concrete and 50,000 lineal feet of sheet piling. 80,000 cubic yards of rock paving three feet thick will be needed to complete the face of the dam.

Very little work can be done during the time of heavy floods, and the construction is to be pushed rapidly this fall and winter so that the dam may be finished before the wet season of 1906. To facilitate construction, large orders have already been placed for prompt shipments of the elaborate equipment necessary to successfully complete the work. Construction will be supervised by specially trained men who will act under instructions from their New York office. As indicative of their determination to finish this great work within the year, it is interesting to know that work was actually commenced by the White Company's engineers within six hours after the contract had been signed.

Monroe & Shelton, who were the principal sufferers from the recent disastrous fire on Front Street, Portland, Or., have risen, like Phoenix from the flames, and opened up new and commodious show rooms at 205 Washington Street, wherein are exhibited a complete line covering their specialities in agricultural and dairy machinery. This firms enterprise is but another example of the "hustle" which is a characteristic of the business man of the Pacific Coast, and we wish to take this opportunity to congratulate Monroe & Shelton upon their quick recovery from an unfortunate experience.

It is stated by the Ideal Stoker Company, of New York City, that they have secured a contract for the installation of "Ideal" stokers at the Bayonne, N. J., works of the Para Recovery Company. The Ideal Company are located at 114 Liberty Street, New York, and will appreciate correspondence and inquiries from those interested in such devices.

JOBBERS	Position	Runs
Goodwin	P—C	1
Bray	L F-P	2
Wyman	S S	1
Sayles	C F	0
Nightingale	R F	1
Holladay	3 B	3
Pennoyer / Drury	1 B	3
Russell	C-L F	1
Sayles	C-2 B	0

CONTRACTORS	Position	Runs
Owen	C	4
Greisberg	S S	3
Yerrington	C F	3
Crairy	R F	4
Jepson	L F	4
Atkins	P	3
Cook	1 B	1
Weiner	2 B	3
Bordfield	3 B	3

AND THE JOBBERS "ALSO RAN."

By Special Wire to THE JOURNAL,

THE CHUTES, SAN FRANCISCO, Saturday, October 21, 5 P. M.

Editor, Journal, Rialto Building San Francisco:

"Run scare heads, fearful slaughter, your correspondent and Aylesworth, official photographer, escaped in Martland's motor car, Wiggins, umpire, and Bibbins, score keeper, among the missing, Jobbers censoring all news, motor broke down, wire authority to draw for carfare, we want to come home."

G. B. E., H. G. A.

Did you see the cloud of dust that rose over Golden Gate Park?

Did you hear the fiendish chortlings of the victors and the desperate rallying yells of the vanquished?

Well, that was IT.

And it all started peaceably enough—who could foresee that it would end in sanguinary conflict?

The Poet Laureate of the electrical fraternity has handed in the following terse little explanation.

"A hunch, a lunch, a game of ball—Contractors-winner! Jobbers-dinner! thats all!"

A deep silence reigned as the opposing forces drew up in battle array, and the umpire, at 2:30 p. m., with stern, set face and with a characteristic "Wigginesque" gesture ejaculated:

"Play ball!"

The Contractors had won the toss and Owen, with a sinister smile, stepped to the plate, gave a professional hitch to his trousers and faced the field. Goodwin tangled himself up into an exaggerated profile of a reverse curve and—

"Ball one!"

They're off!"

Space will not permit a detailed story of the game and the Jobbers would not stand for it. Up to the third inning it was an even bet and then came that fatal third. Weiner died at first on a slow hit to Wayman at short, Bordfeld got a pass to first and purloined second and took third while Sayles got down on all fours and tried to hold Russell's throw on the ground with his hat. Owen came to bat and when the smoke had cleared away the Contractors had ten runs to their credit, at least Bibbins said ten, there might have been more but he could not count them, and it did not matter anyway.

And it was in this inning that Martland began to smile, gently at first and then it grew and expanded until it became one of those all absorbing smiles that makes one think of "pay day" and their "best girl." At the end of the third almost anyone could have borrowed money from Martland. Meantime, Pennoyer, he of the mighty lungs and the melodious "holler," was doing an acrobatic stunt on first that would make a hit with

THE "BLEACHERS"

A "FOUR FLUSH"

Barnum and Bailey's. Every time that anyone would just look at the initial bag Pennoyer would fall down, and he declares that some one with "malice prepense and aforethought had greased the whole blooming field.

Numerous and rapid changes were now taking place on the two "line ups."

We would produce the original score but it would be of no use, as the scorekeeper handed it over at the end of the game he said.

"I'm the goat—what's the answer?"

Russell retired and Goodwin donned the mask and mitt and Bray went into the pitchers box.

In the sixth the Jobbers made a gallant and desperate attempt to retrieve their fortunes and succeeded in bringing in six runs, which helped some; the game was delayed in this inning through the umpires calling a strike on Atkins that did seem a bit elevated, and in the confusion of the heated argument Owens could be heard shouting "High ball! High ball!" and a dozen voices instinctively queried "Seltzer or ginger ale?"

To Atkins falls the glory of the only home run, a long curving "swat" to deep left, way beyond the trees, that brought enthusiastic applause from the "bleachers."

But seven innings were played, and only one unfortunate incident marked an otherwise pleasurable afternoon. Bray, in trying to stop a sizzling hot liner split the third finger of the right hand and was obliged to retire. Holladay, at third, handled himself like an old timer and Wayman at short won much favorable comment for his graceful gyrations. Among the Contractors we might mention—but they won the game and further comment is unnecessary.

As we go to press the following "Rush" telegram is received—

"Will sign the whole bunch, except umpires, for next season; salary no object; answer quick"

Signed, Morley.

And the cause of all this ruction?

The Electrical Contractors and Electrical Jobbers, of San Francisco, decided to play a game of ball for a dinner.

Score—Contractors, 26—Jobbers, 12.

"To the victors belong the spoils."

And the dinner—but as Rudyard Kipling says "thats another story."

TRADE CATALOGUES.

"Flyer No. 276," is the tittle of a neat little folder, describing a newly designed automatic belt-tightening attachment for the Crocker Wheeler Form L Motor.

"Principles of Electrical Power (Continuous Current) for Mechanical Engineers," by A. H. Bate; illustrated. Spon and Chamberlain, 123 Liberty Street, New York; 204 pages. A book giving simple and elementary descriptions of direct current motors, and their principles of operation. From it the layman and engineer without electrical training may get a fair idea of the subject, without the necessity of digging the information out of a large mass of material without particular relevance so far as their requirements go. It does not appeal to the advanced students or the electrical engineer.

"Gas Engines"—Chas. C. Moore & Co., Inc., San Francisco—Illustrating and describing a special line of gas engines exploited by this company—the "Alamo" and the" National." Simplicity, efficiency in regulation and ease of operation is claimed for these engines, and in view of the fact that gas engines are rapidly forging ahead as factors in the power field, this catalogue should prove interesting to a large number of power users. Correspondence is invited and the announcement is made that plans and estimates for the assistance of prospective customers will be gladly submitted.

"The October Bulletin of the Portland General Electric Company", Portland, Or., is a most clever and artistic bit of advertising literature. The illustrations are strikingly unique and the descriptive matter charmingly written bringing forth in an impressive manner the various methods of using the electrical current. It is only a matter of a short time since the central stations began to realize the value of systematic and persistent advertising and that the Portland General Electric Company are fully awake to the advantages of such advertising is evidenced by the publication of the "Bulletin."

"Westinghouse Storage Batteries for Railway Signal Service," issued by the Storage Battery Department of the Westinghouse Machine Company, East Pittsburg, Pa., and serving as an announcement of this new and important branch of the company's business. It is claimed that these batteries have a number of distinct advantages which will appeal to signal engineers. This little folder contains chiefly illustrations, and the cuts are brought out clearly, showing to good advantage the details of the various types of these batteries. Information relative to capacity and prices and full description of this product can be obtained from Catalogue "S" from the Westinghouse Company.

"Catalogue No. 16." The Phoenix Glass Company—An exquisite issue covering this company's output of electric globes, shades, etc. The Phoenix Company have ever been notable for their liberality and artistic conceptions in cataloguing their products, and No. 16 will serve to materially add to their reputation in this respect. The cover is a half tone in blue with the titles in silver lettering, a combination dainty yet striking. Many new and beautiful patterns in glassware, useful as well as ornamental, are exhibited throughout the entire catalogue, and we feel assured that it will be a welcome addition to the reference libraries of the trade.

Bulletin No. 23, "Turbine Alternator Sets," Warren Electric Manufacturing Company, Sandusky, Ohio. This Bulletin covers a very complete description of the Warren Company's output of steam turbines, combined with a modification of the well known Warren inductor type alternator, so designed as to meet the requirements of steam turbine practice. These units are manufactured in sizes of from 100 to 3000 kilowatts and it is stated that the construction and assembling of the complete unit is done in the one factory. The company claim that the Warren steam turbine is a distinct departure in a number of features, the most prominent being the expanding of the steam almost entirely within the nozzle and governing without throttling. The Electric Equipment Company, 425 Mission Street, San Francisco, are the Pacific Coast agents for the Warren Company, and will be pleased to mail descriptive matter upon the request of interested parties.

"The Insulator Book", Supplement No. 1, has been issued by the Locke Insulator Company, Victor, New York, describing the high tension insulators manufactured by this company, and which they have endeavored to make particularly interesting to parties in the transmission field. Those possessing a copy of the "Insulator Book" should write for a copy of supplement No. 1, in order to complete their data on this product. The Locke Company feel considerable satisfaction in announcing that ground has been broken for an addition to their present works to accomodate a modern eight kiln pottery, specially designed for their particular work. This addition will be 180 feet square, two stories high, constructed entirely of re-enforced concrete and will be equipped with the most modern methods of handling clay, coal, etc. The new addition is the second increase to the Locke Company's works in the past year and they claim that its completion will give them the largest plant of its kind in the world.

Convention Number of "Street Railway Journal." The Philadelphia Convention number of the *Street Railway Journal*, of New York, which was issued on September 23rd, came out in three sections, a cover section, a current news section and a Philadelphia Convention section. The latter is a book of 440 pages, 184 pages of which are reading matter. About sixty pages are devoted to a dictionery of railroad material, supplies and apparatus, and the remainder consists of advertising. The reading matter is an elaborate analysis and study of the history, organization, financial characteristics, operating methods and physical properties of the Philadelphia Rapid Transit Company.

INDUSTRIAL

"THE ETERNAL FEMININE" AND THE DAILY GRIND.

IT is an old time saying that "Woman's work is never done," and the next cheerful pessimist you meet will breathe a sigh of regret for "the good old times." Inconsistent? Yes, for it is a fact that in the so-called "good old times" the work of the feminine portion of a household never was done.

The housewife laboriously prepared breakfast on a coal or wood stove with its uncertain heating and cooking efficiencies, roasting in summer and varying in its warmth giving in winter.

The masculine element waited, more or less patiently, for a pan of water to become sufficiently heated to shave with. Then there were the kerosene lamps to be trimmed and filled, an operation both greasy and odiferous.

The household sewing was a daily dread, pumping the peddles of a sewing machine until the limbs and back ached.

The ironing was long drawn out, waiting for the irons to heat on that same blessed stove.

Baby's milk was ever too warm or too cold. Did some member of the family take sick at night it was a matter of time, perhaps a question of life saving time, until the good wife, often bare-foot in her hurry to relieve the sufferer, pottered around a cold kitchen, lit the fire, and prepared the hot water bag or bottle.

Cooking, sewing, washing, ironing, nursing, all a fierce drain

on the vitality of the woman "in the good old times."

And it took a mighty good Christian woman to uncomplainingly hold a curling iron over a kerosene lamp, watch through the door to see that the rice did not boil over on the stove and at the same time sing a lullaby to baby.

Can we wonder that so many fresh, sweet young girls, dainty as a new blown rose on their wedding day, were soon transformed to stooping, aching, rather withered women before their time.

Can this terror of the "daily grind" for our mothers, wives and sisters be avoided?

An interesting little sketch entitled "Overheard in the Street Car," published by the Standard Electrical Construction Company, 120-130 New Montgomery Street, Rialto Building, San Francisco, would lead one to believe that the adoption of electricity in the home in connection with their "Simplex" heating devices will make housekeeping a pleasure and a delight.

A full line of these modern "helps to married happiness" is carried in stock by the Standard Company and is on exhibition at their ware rooms. A copy of the sketch and a catalogue on "Electric Heating" illustrating numerous devices of this kind will be mailed on request.

SPOKANE AND INLAND RAILWAY.

A CONTRACT has just been closed with the Spokane and Inland Railway Company by the Westinghouse Electric and Manufacturing Company, of Pittsburg, Pa., for the equipment of an electric road, the present terminals of which will be Spokane, Wash., and Moscow, Idaho, 146 miles apart. The roadway is completed from Spokane to Waverly, a distance of thirty-four miles, and operation will be begun on this as soon as possible. The road is a home enterprise, the stock being held entirely by men living in the district through which the line passes—business men, professional men and farmers. The directors of the company are J. P. Graves, president; F. A. Blackwell, vice-president; F. Lewis Clark, John Twohy and Alfred Coolidge, all men of wealth, who have been so long identified with enterprises of magnitude that their names insure the success of any undertaking with which they associate them.

In selecting the equipment for this road, both the alternating current, direct current and single-phase system were considered, but after careful comparison the single-phase alternating current system was adopted. Not only did the estimates show a large saving in initial investments and in annual operating expenses in favor of the single-phase system, but a form of heavy traction is made possible which would be practically unfeasible with the alternating current and direct current equipment. Besides the passenger traffic the company is preparing to do a heavy freight business and also to carry mail and express.

Power for the operation of the road will be purchased from the Washington Water Power Company who will supply three-phase current at 4000 volts, 7200 alternations, to a frequency changing station approximately one and one-half miles from the generating station. Seven 750-kilowatt, oil-insulated, water-cooled transformers will step down the voltage from 4000 to 2000 volts, the potential for which the induction motors of the frequency changing sets are wound. There will be four of these motor generators or frequency changers of 1000 kilowatts capacity each at normal rating. Each consists of a 1000 horsepower, three-phase, 2000-volt, sixty-cycle, induction motor, a 1000-kilowatt, single-

phase, 2200-volt, twenty-five-cycle revolving field alternator, and a 750 horsepower, 550-volt, direct current generator which is to float on the storage battery acting alternately as a motor and generator. The three machines will be mounted on a single bed plate with seven bearings. Exciting current for the alternators will be supplied by three sets, each consisting of a seventy-five horsepower, three-phase, 2000-volt induction motor and a fifty-kilowatt direct current generator.

Nine 675-kilowatt, oil-insulated, water-cooler transformers will step up the voltage from 2200 to 45,000 volts, at which pressure it will be transmitted to the fifteen static transformer substations, each containing two 375-kilowatt, 45,000-6600-volt, oil-insulated, self-cooling transformers. A twenty-three panel switchboard, electrically operated automatic oil circuit breakers, and protective apparatus complete the equipment of the frequency changing station. Low equivalent lightning arresters and choke coils are provided for both primary and secondary circuits in all substations.

The transmission lines will consist of two No. 2 copper wires and the trolley will be of the standard catenary construction, using a No. 000 wire and carrying current at 6600 volts.

Each passenger car will be equipped with four 100 horsepower motors, capable of maintaining a schedule speed at thirty-five to forty miles an hour. In the freight service for 150 horsepower motors will be used on each car. For the heavy freight service double locomotives weighing approximately seventy to eighty tons will be used, each consisting of two parts and each part a complete thirty-five to forty-ton locomotive. Two or more of these locomotives may be coupled together and operated from the front cab as a single unit. The motors, cars and locomotives will all be operated by the Westinghouse multiple unit control system. The motors will operate under three different conditions, 6600 volts alternating current in the interurban districts, 700 volts alternating current in the smaller towns, and 575 direct current in the city of Spokane.

AN ATTRACTIVE ADVERTISEMENT.

THE illustration herewith is a reproduction on a small scale of an exceedingly attractive piece of advertising being put out this month by the Welsbach Company, of Philadelphia, Pa. The original is a work of art of sixteen colors, done on heavy tin mounting, twenty-three by thirty-three, with black border of two inches which sets off the prettily colored picture to good effect. As will be seen by reference to this picture, it illustrates a handsome woman in full evening dress, standing near a dresser, which is ornamented by two Welsbach lights, that emit a soft red glow through their daintily decorated globes. The color effect resulting from these lights is shown exceedingly true to life.

This company is distributing this expensive advertisement throughout the Pacific Coast to the different gas companies, and it has been received everywhere with appreciation.

The Welsbach Company, in addition to the above, has issued a pleasant and interesting booklet, entitled "A Little Talk on Gas," which is just the right size to carry in your pocket, or keep before you on your desk, or in your home. It measures three and a quarter by five and three-quarters inches, of eight full pages of information, which are worthy of very careful perusal and attention. It is brief and to the point in its text, and easily holds your interest from front to back cover. On this attractive front cover appears the portrait of a pretty woman and a Welsbach light encircled in minature portrait style, giving a pleasing effect to the reader about to open the book. This picture is suggestive of the instructive reading matter to follow, and one can spend an interesting half hour in absorbing the information contained in this attractive booklet.

As you turn its pages, you are shown both by word picture and excellent illustrations, the different uses to which the Welsbach lights can be put. The illustrations, ten of them, occupy about a half a page each and are followed by terse and interesting facts concerning the certain forms of light depicted in the illustrations.

First comes the use of the Welsbach arc globes in the modern reception room. Next follows the new and exclusive form of Welsbach light called the Harp fixture. An ideal light for dining and living rooms. Next is shown a light of similar construction, but with different decoration for use in the kitchen or in store windows, or in fact any place where concentrated light is desired. Both these are exclusive Welsbach productions.

Following this the reader is carried along interestingly by word and picture through the further uses of the Welsbach light. You are shown its adaptability to the billard room by its use with a special billard reflector over the table. Again, the form of Welsbach light suitable for porch is described and pictured.

The booklet also treats on the large number of portable lamps, the company claiming the honor of placing over 180 different styles of these lamps on the market this season, of which it is justly proud.

Further on the subject of gas arcs is briefly but instructively touched upon. The inside arc is depicted as illuminating a busy department store. Its small cost of two cents an hour to burn is well worth noting. The outside gas arc next appears shown in use in exterior lighting of an attractive shop window. The article touches on the light from an economical standpoint that is minimum consumption of gas for the maximum light.

Last, but not least, is shown the new form of light, named the "Chic" light, which is suitable for every room in the house. It is furnished in all colors of globes and designs. One form of this light is especially adapted for use in the bath room, and in this respect fills a long felt want. It is an exclusive Welsbach output.

Lack of space prevents one from going into further details of this instructive and valuable little booklet, which has to be read in full before one can realize and appreciate the numerous and pleasant forms of Welsbach lights which are now being placed on the market by this company for the coming winter.

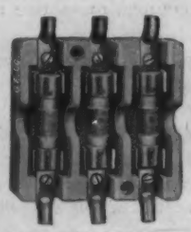
As a fitting close to such an attractive book, the two last pages have been devoted to portraying the forms of lamps in catalogue style. Prices are quoted.

The Welsbach Company has placed this booklet on free distribution at the Welsbach store at 359 Sutter Street, San Francisco, and all communications addressed to them will receive prompt attention.

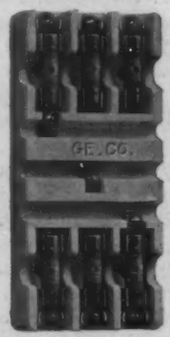
GENERAL ELECTRIC COMPANY'S NATIONAL ELECTRICAL CODE STANDARD ENCLOSED FUSES AND CUT-OUTS.

THE General Electric Company is now furnishing a complete line of National Electrical Code Standard Enclosed Fuses and Cut-outs ranging from three to 600 amperes in both the 250 and 600 voltages. The cut-outs and fuses are uniformly compact and durable and the insertion or removal of the fuses is easy and safe.

For fuses rated from three to thirty amperes, 250 volts, cut-outs similar to the Edison plug cut-outs are furnished, and for fuses from thirty-one to sixty amperes, 250 volts, two and three wire



THREE-WIRE MAIN LINE, 250-VOLT, 31-60 AMPERE CUT-OUT



THREE-WIRE, DOUBLE BRANCH, 250-VOLT, 3-30 AMPERE CUT-OUT

TWO-WIRE, CROSSOVER 250-VOLT, 3-30 AMPERE CUT-OUT

main line and single branch cut-outs are supplied. All other sizes of fuses are provided with single pole cut-outs. With all cut-outs are used the General Electric wrought copper cable terminals, with the exception of the thirty ampere, 250-volt sizes. These are provided with washer and screw terminals.

The fuses are of the well known enclosed fuse type, ferrule or knife blade contacts being used according to the requirements of code. The knife blade type, in addition to the standard parts,

250-VOLT, 30-AMPERE, RENEWABLE FUSE PLUG

SINGLE-POLE, 600-VOLT, 401-600 AMPERE CUT-OUT

250-VOLT, 65-100 AMPERE FUSE

250-VOLT, 31-60 AMPERE FUSE

has a brace placed in each end of the tube to engage the screws which hold the end caps in place. This forms a strong mechanical joint which does not depend solely upon the shearing strength of the fibre tube. The knife blade contacts are of punched copper, and when used with the standard switch clips provide the best form of contact. The parts being copper of high conductivity generously proportioned the heating is reduced to a minimum.

In the ferrule type the contacts are made by phosphor bronze clips designed to give the utmost contact and elasticity in the smallest possible space.

The renewable fuse plug consists of a brass tube with the lower end threaded to fit the standard screw shell, and the upper part insulated by a porcelain shell. There is also in the upper end a spring clip which receives the ferrule contact of the reload, the ferrule on the other end forming the center contact of the plug. The reloads are the thirty and sixty ampere, 250-volt enclosed fuses.

ELECTRIC EQUIPMENT COMPANY.

LOCATED at 425 Mission Street, San Francisco, in spacious, well lighted offices and sales rooms, and with ample ware room capacity for carrying a large and varied stock of electrical apparatus and devices, the Electric Equipment Company, successors to the Bishop-Wilbur Company feel that they are in a most advantageous position to further increase their already large and growing interests.

G. A. Wilbur, formerly general manager of the Bishop-Wilbur Company, is the active head of the Electric Equipment Company, and has been well and favorably known in Pacific Coast electrical circles for some years, and his genial personality is an assurance of a cordial welcome to visitors to the company's new quarters. Mr. Wilbur states that it is their design to carry a full line of electrical machinery and appliances, both for alternating current and direct current work, and that they will be in a position to figure on complete steam and electrical plants for light and power.

The Electric Equipment Company are the Pacific Coast agents for the following well known manufacturers:

Warren Electric Manufacturing Company, Sandusky, O.; steam turbines and inductor type alternators.

Commercial Electric Company, Indianapolis, Ind.; induction motors, single, two and three phase. A stock of these motors, ranging from one-half to thirty kilowatts will be carried.

Triumph Electric Company, Cincinnati, O.; direct current motors and generators. It is intended to carry in the San Francisco ware rooms a line of this apparatus from one to twenty kilowatts.

Lafayette Electric Manufacturing Company, Lafayette, Ind.; manufacturers of the Hornberger transformer. Close attention to the electrical and mechanical design and a high efficiency is claimed for these transformers, and the Electric Equipment Company will be able to make immediate shipment of sizes from one to thirty kilowatts.

Other lines represented and well stocked are: The Duncan Electric Manufacturing Company, Lafayette, Ind.; manufacturers of the Duncan direct current wattmeters. These wattmeters will be carried in all voltages and up to 150 amperes.

The Condit Electric Manufacturing Company, Boston, Mass.; oil switches and circuit breakers for every class of service. Specifications are requested for special requirements in this line and estimates will be promptly furnished.

Jewel Electrical Instrument Company, Chicago, Ill.; portable and stationary instruments for alternating current and direct current work. Reasonable first cost and absolute reliability is claimed for the Jewel product and a full line of portable instruments will be on exhibition.

Jandus Electric Company, Cleveland, O.; enclosed arc lamps for all classes of service, also fan motors and ceiling fans. This product is very completely represented in the Equipment Companys stock.

The establishment of this company in their new quarters is not only an evidence of their own growth and enterprise but it emphasizes the fact that the electrical industry of the Pacific Coast is in a most pleasingly healthy condition and that the Eastern manufacturers are realizing more and more the necessity of energetic representation and the carrying of complete stocks of standard appliances.

At a directors' meeting of the Crocker-Wheeler Company, manufacturers and electrical engineers, Ampere, N. J., the regular quarterly dividend of 1¼ per cent. was declared.

MALTHOID ROOFING IN THE CITY OF DALNY.

TRAVELERS will tell you that Dalny is a magnificent port built by the Russians at the entrance of the Gulf of Pe-Chi-Li, near Port Arthur, and, before the war was destined to become the principal city of North China. Owing to the greater elevation of the ridges surrounding its bay, Dalny is far better protected from southeasterly gales than Port Arthur, and for that reason was chosen by the Russian government as the site for its principal commercal port on the Pacific Ocean. The City of Dalny, was carefully laid out according to modern standards of hygiene and comfort, and stringent regulations prevented the crowding of houses side by side. The Russians were very proud of Dalny, and when they abandoned all hope of preventing the Japanese from capturing it they set fire to residences, stores, school houses, sheds, depots, warehouses, etc. As these buildings were built of brick and stone the interiors and roofs only were destroyed. The Japanese army has rebuilt the city of Dalny with Malthoid roofing. Malthoid roofing has been used extensively by the Japanese government for several years, and has proved to be durable, long lasting and exceptionally convenient and inexpensive for army use.

The compactness and ease with which it can be transported, together with the fact that all of the necessary nails, cement, tin caps and directions are contained in each roll, enabled the Japanese army to quickly, inexpensively and thoroughly re-roof the buildings that had been partially destroyed by fire and the devastation of war.

Through the hot Asiatic summer Malthoid roofing stands the torrid heat without cracking, expanding, opening, running or blistering. When the fall rains set in and pour down on this sun beaten roof, it does not leak, and later when the mid-winter cold spell comes it does not injuriously affect Malthoid roofing in the least—for this roofing does not crack nor freeze, but remains strong, durable, pliable, weather and waterproof all the year round. Samples and booklets; if you wish them write to the Paraffine Paint Company, 24 Second Street, San Francisco, Cal.

THE GREEN FUEL ECONOMIZER.

THE Green Fuel Economizer Company, of Matteawan, New York, has just completed the erection of a large shop designed to provide for its rapidly increasing business. This company ont only supplies special exhausters with bearings removed from the action of the flue gases for mechanical draft in connection with the widely used Green Fuel Economizer, but also builds fans, blowers and exhausters for every purpose, having, for instance, recently sold fans for heating, ventilating and humidifying in textile mills, ventilating and drying in paper mills, heating and ventilating in large buildings, etc. It is just now installing the largest mechanical draft exhauster ever built for a factory in Massachusetts.

New designes have been worked out for all types of "Green-Matteawan fans with the special object of reducing the power required for driving. Fans are often driven by small non-condensing engines or by electric motors using purchased electric power, so this is quite an important matter. Fan builders, however, under the stress of competition and to increase profits, have frequently offered small, inefficient, high-speed fans where true economy for the purchaser would have indicated larger, slower moving fans. It should be remembered that the power consumed by a fan runs up very rapidly with the speed.

The Green Fuel Economizer Company does not contract for the engineering of plants, or for the installation of heating and ventilating plants in competition with the heating and ventilating contractors, but freely offers the advantages of its engineering skill and sixty years experience in the construction and operation of air moving plants.

The Laidlow-Dunn-Gordon Company, of Cincinnati, O., have just issued a very neat and exhaustive bulletin on the subject of the Improved Cincinnati Air Compressor.

AN IMPORTANT CONTRACT CLOSED.

THE Pelton Water Wheel Company, of San Francisco and New York, has closed an important contract with the Oro Water, Light and Power Company, of Oroville, Cal. This covers two complete Pelton units of 2000 horsepower capacity each, direct connected to electric generators, the wheels operating under 465-foot head. The water wheel arrangement embraces the "double overhung" type of construction, which is typical of Pelton apparatus, especially in connection with engine type generators, forming a compact and self contained unit. Sturgess governors will be employed, the requirements in this regard being exceedingly severe, as the current is to be used for both light and power. The latter involves the operation of gold dredges, in which the flunctuations of power and load are very sudden and heavy.

Other recent orders are, a wheel equipment for the Crown Columbia, Paper and Pulp Company, of Washington, consisting of a triple Pelton unit for direct connection to heavy pulp grinders in the paper mills. The wheels are mounted upon a steel shaft eighteen feet in length, provided with an oil thrust bearing of special design. Takata & Co:, have ordered a 300 horsepower unit for Tokio, and a large wheel has just been furnished the Ingersoll Sergeant Drill Company for direct connection to one of their compressors.

Owing to the steady growth of its business, the Pelton Water Wheel Company is obliged to enlarge its works, and to that end has purchased a block of land in South San Francisco, where a modern machine shop is now under course of construction. This new shop will be equipped with the latest high grade tools and handling devices, and it is expected to be a model of its kind, affording exceptional facilities for construction of high grade apparatus.

THE JOHN M. KLEIN ELECTRICAL COMPANY INC.

IT is a busy scene that confronts the visitor to 105-107 Battery Street, San Francisco, the headquarters of the John M. Klein Electrical Company, Inc. One would fain change the old story ending "vat we vant iss orters" to "vat ve've got iss orters," after trying to get the ear of one of the busy gentlemen at the head of this company's affairs. Extension and improvement is the order of the day, and it is the expressed intention of the Klein Company to carry one of the most complete stocks of electrical supplies and novelties on the Pacific Coast, and an inspection of their establishment indicates that they are energetically working to carry out their intention. Wagner single phase motors have recently been added to the already large list of selling agencies. It is a pleasure to record these evidences that electrical affairs on the coast "do move" and the above company is certainly doing their share of the moving.

NEW CONTRACTS CLOSED.

"The Electric Storage Battery Company, has closed the following contracts recently in Spokane. One regulating railway battery, consisting of 312 cells type 27—G, with booster and switchboard, for the Spokane Terminal Company. The batteries each consisting of 312 cells type 13—G, in 17—G tanks, to be installed in rotary substations, and one line battery consisting of 288 cells type 13—G in 17—G tanks, for the Coeur d'Alene and Spokane Railway Company Ltd. One battery consisting of 275 cells type 33—R with booster, switchboard and carbon regulating device, to be installed in the phase and frequency changer substation of the Spokane and Inland Railway.

The Pennsylvania Railroad Company has very recently placed an order with the Westinghouse Machine Company for Roney mechanical stokers to extend their already large equipment at Altoona. Two new boiler plants were erected at Altoona only a few years ago for supplying steam power at the Altoona shops. It is stated that both these plants were equipped throughout with the Roney stoker.

THE NERNST LAMP COMPANY.

RECENT developments in the Nernst lamp business, on the Pacific Coast, have made a stronger organization of this company necessary. Arthur F. Salomon, who has been appointed general sales agent for the Pacific Coast, has lately turned over the Northern Pacific states to the Kilbourne & Salomon Co., Inc., in Seattle. The San Francisco office and sales department, the latter in charge of Messrs. H. H. Daley and G. J. Lawson, is located at 519 Mission Street. It is stated that new offices will soon be created in Los Angeles to look after the company's interests in southern California and the contiguous territory. A new price list, No. 4, 1905, has just been published and will be mailed on application to these interested, also the regular Central Station Bulletin which, it is claimed, contains many facts of interest to engineers in charge of central lighting stations.

JNO. MARTIN & CO.

JNO. MARTIN & CO., announce that on November 1st their Seattle branch was reopened with offices in the Pioneer Building. R. H. Husbands, who has charge as local manager, was associated with the Pittsburg Reduction Company in their New York offices up to the time of his present engagement, and is thus peculiarly fitted to handle the interests of Jno. Martin & Co. on account of his familiarity with electric power transmission and railway material. The lines handled by the Seattle office are identical with those handled by the San Francisco office, consisting of insulators, transmission line wire, railway feeders, accessories and water wheel governors.

NEW INCORPORATIONS.

Rathdrum, Ida.—The Rathdrum Light & Power Company has been reorganized under the name of the Rathdrum Electric Company. R. L. Cole will act as superintendent of the company.

Salinas, Cal.—The Carmel Water Company has been incorporated to engage in business at Carmel-by-the-Sea, by H. W. Sabin, Carl Stevens and C. T. Ryland. The company has a capital stock of $200,000.

San Francisco.—The West Coast Electric Light & Power Company has been incorporated here with a capital stock of $25,000 by J. F. Hathaway, T. F. Fogesang, C. R. Lundberg, W. T. Hume and C. Ulmer.

SALT LAKE, UTAH—The Eastern Utah Telephone Company, of Price, Utah, has filed articles of incorporation here, the capital stock being $50,000. The incorporators include R. G. Miller and A. McGovenery.

OLYMPIA, WASH.—The Seward Co-operative Telephone Company, of Seattle, has filed articles of incorporation here. The company has a capital stock of $25,000, the incorporators being Wm. Callhoun and Henry C. Ewing.

Junction City, Ore.—The Gilmore Water-Power Company has been incorporated here by S. P. Gilmore, Emma Gilmore and Eliza Gilmore for the purpose of establishing water works for irrigation and other purposes.

Portland, Ore.—The Cable Cove Power Company has been incorporated at Sumpter, Ore., with a capital stock of $100,000 by T. C. Gray, O. C. Wright and E. R. Jones. The company has filed its articles of incorporation in Baker, Grant and Union counties.

WINNEMUCCA, NEV.—The International Power Company, organized by Salt Lake people, has filed its articles of incorporation here, with a capital stock of $1,500,000, to construct and operate electric light and power plants, electric railways, telephone and telegraph lines.

Los Angeles.—The Valley Electric Company has been incorporated with a capital stock of $500,000 by R. F. Davis, E. A. Miller and A. Morris of Los Angeles and T. D. Allin and B. Galbraith of Pasadena. The company owns the electric lighting plant at Santa Maria.

BOISE, IDAHO—The Boise Valley Railway Company has been incorporated here by B. F. Holden, Jno. McMillan, Robert Noble, A. Ross, H. E. Neal and others, of Boise, with a capital stock of $1,000,000, for the purpose of building an electric railway from Boise to Caldwell.

Heppner, Ore.—The Hinton Creek Telephone Company has been organized here with a capital stock of $1,000 by R. F. Hynd, I. Howard and T. J. Matlock. The company intends to build a telephone line from Heppner up Hinton Creek and to Galloway.

DRAIN, ORE.—The Drain Water Power, Light and Telephone Company is being organized here by Ira Wimberly, Benton Mires, W. W. Kont, W. C. Edwards and Sam Jones. The company will install water works and a distributing plant at Drain at a cost of about $30,000.

SPOKANE, WASH.—The Big Bend Water Power Company has been incorporated by J. H. Tilsey, J. E. Peterson, Ruben Cross, R. M. Barnhart and A. J. Laughon, for the purpose of developing 15,000 horse-power at a point 28 miles from Spokane. E. T. Tennant is preparing the plans.

LOS ANGELES, CAL.—The Santa Paula Home Telephone Company has filed articles of incorporation here, the capital stock being $60,000, of which $10,000 is subscribed. The incorporators are C. F. Guthridge, M. Zalm, Arthur Wright, D. F. Boyce and C. F. Platt, all of Los Angeles.

SAN FRANCISCO, CAL.—The Northern Water and Power Company has filed articles of incorporation here. The capital stock of the company is $5,000,000, the amount subscribed being $500. The directors are H. L. Atkinson, C. P. Pritchard, T. A. Allan, Thomas Turner and C. B. Greeley.

SANTA FE, N. M.—The Northern New Mexican and Gulf Railway Company has been incorporated here by W. H. Coe, E. G. Miller, F. E. Coe, G. H. Howard and G. V. Howard, for the purpose of constructing and maintaining railroads and telegraph lines. The company has an authorized capital stock of $300,000.

VANCOUVER, WASH.—The Vancouver and Suburban Railway Company has been incorporated here by W. H. C. Sugg, J. H. Sugg, M. R. Sparks, E. E. Beard, E. M. Green, E. E. Waite and W. S. Wood, with a capital stock of $2,500,000. The company has asked for a franchise covering some of the principal streets of the city.

Salinas, Cal.—The Monterey County Water Works have been incorporated with a capital stock of $1,000,000 to operate water works in Monterey County. The incorporators are Chas. E. Green, H. G. Platt, A. D. Shepard, J. E. Polhemus and Geo. E. Crothers, all of San Francisco. San Francisco will be the headquarters of the new incorporation.

TACOMA, WASH.—The Nisqually Power Company, organized with a capital stock of $100,000, to build a power plant below Eatonville, near the Tacoma Eastern Railroad, has filed articles of incorporation in this city. The incorporators are R. L. McCormick, secretary of the Weyerhauser Timber Company; Edward Cookingham, president of the Tacoma Eastern Railroad; Geo. S. Long, Tacoma agent for the Weyerhauser Timber Company, and John Bagley, manager of the Tacoma Eastern Railroad. The company will develop power for use in the logging camps.

San Francisco, Cal.—The Stanislaus Electric Power Company has been organized with a capital of $10,000,000, $6,000,000 of which has been subscribed. The financiers of the new corporation are Tucker, Anthony & Co. of Boston and the Knickerbocker Trust Company of New York. Beach Thompson of this city was the organizer of the company and Leopold Wallach of New York interested Eastern capital in the enterprise. Both Leopold Wallach and Leopold Michels, president of the San Francisco Coke and Gas Association of this city, are heavily interested in the new power company.

San Francisco.—Articles of incorporation of the Pacific Gas & Electric Company were filed in San Francisco on October 10th. The capital stock of the company is placed at $30,000,000, of which $1,500 was subscribed at the time of the filing of the papers. The incorporators are E. J. de Sabla Jr., John Martin, F. G. Drum, G. W. McEnerney, J. S. Drum, J. A. Britton, Cyrus Peirce, Carl Taylor, G. K. Weeks, F. D. Stringham, M. O. Evans Jr., A. N. Kemp, G. W. Lewis, G. R. Parker and L. F. Young. The new company takes over the California Gas & Electric Corporation and the San Francisco Gas & Electric Company.

The company has been organized to furnish this city with electric power and probably will be closely allied with the San Francisco Coke and Gas Company. It is understood work has already been commenced on the middle fork of the Stanislaus river. The plans of the company call for 30,000 electrical horse-power, and in addition to that, water power equivalent to 20,000 electrical horse-power. Two enormous storage reservoirs are to be built, which will take in about 1,500 acres, and enough timber land is to be purchased to provide for the lumber necessary for the construction of flumes and buildings. There is to be no delay in the prosecution of the work, as it is the desire of the company to get into this city as soon as is possible.

FINANCIAL.

San Francisco.—Walter H. Linforth has been awarded $10,800 damages by a jury in his suit against the San Francisco Gas & Electric Company.

Marysville, Cal.—It is reported that the Marysville and Susanville Railway Company has sold its property and privileges to the Western Pacific.

San Francisco, Cal.—A dividend of 25 cents per share was declared by the California Gas and Electric Corporation on September 25th, payable on October 16th.

San Francisco, Cal.—The directors of the O'Brien Reflector and Electric Tube Lamp Company have levied an assessment of 30 cents per share, payable on October 19th.

Portland, Or.—It is announced that Wheeler & Co., of New York, are to finance the Cable Cove Power Company, of this place, which will erect a power plant near Sumpter, Oregon.

San Francisco, Cal.—A special meeting of the stockholders of the Sacramento & Lake Tahoe Railway Company will be held here on November 9th, to consider the creating of a bonded indebtedness of $5,000,000.

Kelseyville, Cal.—A special meeting of stockholders of the Kelseyville Natural Gas, Light and Power Company has been called for November 22d, to vote on the proposition of increasing the capital stock of the company from $50,000 to $150,000.

San Francisco, Cal.—The directors of the General Electric Power Company, of California, have called a stockholders' meeting to be held on December 6th, to act on the proposition of increasing the company's capital stock from $1,000,000 to $7,500,000.

San Jose, Cal.—The Santa Clara Interurban Railway Company has sold all its property, franchises, etc., to Lewis E. Hanchett of San Francisco. This includes an option held by the company on the properties of the San Jose and Santa Clara Street Railway Company.

San Francisco.—The Supreme Court has set aside the verdict of the Colusa County Court awarding Frank Reeve, of Colusa, damages to the amount of $30,000 from the Colusa Gas & Electric Company. Mr. Reeve was injured in September, 1901, while in the employ of the company.

Seattle, Wash.—The Seattle-Everett Interurban Railway Company has mortgaged its rights of way, franchises, and equipment to the Union Trust Company, of Pittsburg, to secure a loan of $2,000,000, the proceeds of which are to be used to complete the company's electric railway system between Seattle and Everett.

Eugene, Ore.—I. W. Anderson, Spokane, and A. Welch of Salem, representing Rhoades, Sinkler & Butcher of Philadelphia, have closed the option which the latter house has had on the Lane County Electric Company's plant at Springfield and will take possession in a few days. The plant will be operated under new management.

San Francisco.—The officials of the Geary Street & Ocean Railroad Company have filed with the city treasurer the following sworn statement of the gross receipts for the month of September: From passengers, $12,156.75; school tickets, $90.50; letter carriers, 84 cents; advertisements in cars, $150. Total gross receipts, $12,398.09. Of this amount 5 per cent goes to the city.

TRANSMISSION.

Atland, Alaska.—The power plant of the Atland Electric Company has been destroyed by fire.

Virginia, Nev.—The Overland & Haywood Mine, which has just been sold, will be equipped with an electric hoist and milling plant.

Reno, Nev.—The transmission lines of the Reno Power, Light & Water Company are to be extended into Burke's addition at once.

Ukiah, Cal.—The Board of Supervisors of Mendocino County has granted the Eel River Power and Irrigation Company a franchise to erect and maintain a transmission line between Potter Valley and Ukiah.

Union, Ore.—The Grande Ronde Electric Company is preparing to expend between $16,000 and $20,000 in securing an entrance for its transmission line into Union and in the construction of a sub-station at this place.

Vernal, Utah—F. M. Lyman, Jr., of Salt Lake, has made application for water to develop a total of 60,000 H. P. Electricity will be generated for distribution in Salt Lake, Heber, Park City and other places.

Helena, Mont.—The Helena Power Transmission Company has placed a contract with the Westinghouse people for a large electric plant to supply power at 70,000 volts to mines in the vicinity of Butte and Anaconda.

Visalia, Cal.—The Board of Supervisors has decided to advertise for sale a franchise for an electric transmission line along the county highways. The action was taken in accordance with the application of A. J. Wishon of Fresno.

GOLDFIELD, NEV.—The transmission line of the Nevada Power, Mining and Milling Company has been completed and the plant has been tested out. The company expects to begin furnishing power from the second generator very soon.

RICHFIELD, UTAH—The Sevier Consolidated Mining Company is to install an electric plant, under the management of Mr. Foster, to furnish its mines and mill with light and power. The plant will be erected in Clear Creek Canyon.

Baker City, Ore.—The Baker City Electric Light & Power Company has begun the construction of a transmission line connecting its power house on Rock street with Bourne for the purpose of furnishing light and power to that town.

EUREKA, CAL.—The North Mountain Power Company is building a 56x30-foot extension to its East Eureka station. A 700-H. P. generator, 500-H. P. motor, two banks of transformers and the necessary switch boards have been ordered for the addition.

Modesto, Cal.—The Stanislaus Light & Power Company has completed surveys for reservoir sites at Brightman's Flat and Kennedy's Meadows near Sonora. The company has claims to 10,000 inches of water which will be used in generating electric power.

Phoenix, B. C.—H. H. Shallenberger of Spokane, Wash., and L. T. Dixon of Chicago are preparing to install an electric plant to operate a hoist, ventilating fan, pump, five drill compressor and a lighting plant at the Crescent Mine between Phoenix and Greenwood.

Tacoma, Wash.—General Manager Dimmick of the Tacoma-Puyallup street car line states that the company is preparing to erect a power plant at Tacoma for the purpose of generating power for operating the electric street railway line.

Oroville, Cal.—The Oroville Light & Power Company has a force of seventy-five or eighty men at work near Pentz clearing ground for the large new power plant that is to be built there. In the course of the next ten days there will be another force put to work.

Fort Bragg, Cal.—On October 23d the Board of Trustees of Fort Bragg will open bids for the sale of a franchise to construct and operate electric transmission lines along the highways of Fort Bragg. The action is taken in response to the application of the Fort Bragg Electric Company.

Wainiha, Kauai, T. H.—Henry Jaeger, contractor for the tunneling and ditching for the new electric power plant at Wainiha, states that he has run twenty-six tunnels, with a length of about three miles. The ditch work is through solid rock and will not need concreting.

TRUCKEE, CAL.—The Truckee River General Electric Company reports good progress in the construction of its pole line from the new power plant to the Comstock. Two 800-H. P. electric motors which are to be installed on the 3,100-foot level for operating pumps have reached the Comstock.

Merced, Cal.—The Merced Falls Gas & Electric Company has purchased eighty acres of land in Mariposa County, on which a power plant of 5,000 h. p. capacity will be built. From this plant power will be transmitted to Merced and vicinity over a line about seventy miles long.

Richfield, Utah.—A. J. Poulsen is promoting the organization of a company to install an electric power plant near Elsinore for the purpose of developing electricity for use in the Gold Mountain and Seiver Valley districts. Mr. Poulsen plans to erect a plant at a cost of about $60,000.

Santa Ana.—The Los Angeles Interurban Electric Company has asked the Board of Supervisors to advertise for sale a franchise for an electric transmission line over certain roads of the county. The route proposed is practically the same as that followed by the Southern Pacific Railroad between Santa Ana and Newport.

Redding, Cal.—The Shasta Power Company has completed four buildings at its power house site on Snow Creek. The company has a force of men at work along the line of the ditch which will convey water to the power house. Eighteen-inch high pressure steel pipe is now being hauled to the plant from Anderson.

BELLINGHAM, WASH.—Stone & Webster, of Boston, who recently purchased the Nooksack Power Plant from the Bellingham Bay Improvement Company, will, it is reported, spend $200,000 in completing the plant to a capacity of 2,000 H. P., and has plans under way calling for an expenditure of $1,000,000 and the development of 25,000 H. P.

Redding, Cal.—William Ellery, formerly connected with the McCloud River Power Company, has filed claims on 120,000 inches of water in the McCloud River for the purpose of generating electric power. It is the purpose of Mr. Ellery to erect a power house at the point where the McCloud River Electric Power Company planned to put up its plant.

Stockton, Cal.—The directors of the Stockton Electric Railroad Company have announced their intention of making the road a standard gauge line. After the entire system in Stockton is standardized the directors assert that the system will be extended to connect with nearby towns in San Joaquin and Stanislaus Counties.

Olympia, Wash.—Leopold Schmidt has begun work on the construction of a concrete dam at the lower Tumwater Falls near this place. The construction of the dam will seriously interfere with the power plant of the Olympia Light & Power Company and is expected to bring the litigation between rival claimants to the water power to an acute stage.

San Andreas, Cal.—The Board of Supervisors has accepted the bid of the Sierra Nevada Water & Power Company for a fifty-year franchise to establish an electric transmission line and conduits along the public roads of Calaveras County. The company is constructing a dam near Railroad Flat, the work being under the supervision of C. Martell, president of the company.

Salt Lake, Utah.—The Telluride Power Company of this place has filed application for 60 second feet of water from the Duchesne River for power purposes. The company purposes erecting a power plant for the purpose of furnishing light and power for Park City, Salt Lake, Bingham, Mercur, Eureka, Price and other localities. The water will be diverted through a canal 60,700 feet long.

Red Bluff, Cal.—Geo. W. Bush, of Redding, has filed claims on 18,000 inches of water in Battle Creek below the mouth of Baldwin Creek for the purpose of generating electric power. Water is to be conducted in a canal 25 feet wide and 6 feet deep and in wooden pipes 10 feet in diameter for a distance of six miles on the north side of Battle Creek to the vicinity of Horseshoe Bend.

Grants Pass, Ore.—The American Goldfield Company is planning to extend about $25,000 in the installation of electric equipment at the Granite Hill mines. A contract has been closed with the Condor Water & Power Company for 600 h. p., which will be supplied from the latter company's plant at Gold Ray. The American Goldfield Company will install two electrically driven Turbine pumps on the 400-foot level.

TRANSPORTATION.

Oroville, Cal.—Grading is about completed on the east section of the roadbed of the Northern Electric Railroad Company.

Santa Cruz, Cal.—Final surveys for the extension of the Capitola Electric railway to Soquel have been completed.

Los Angeles, Cal.—Work began on the Pacific Electric Company's extension from Lamanda Park to Sierra Madre the first week in October.

Long Beach, Cal.—The town trustees will receive bids up to November 1st for an electric railway franchise along the streets of Long Beach.

CHICO, CAL.—Sealed bids for the street railway franchise asked for by H. A. Butters will be received by the City Council on or before November 1st.

Roswell, N. M.—J. O. Hamilton, Clymer, Coldren, J. W. Hall and others have asked for a franchise to construct and operate a street railway line in Roswell.

Placerville, Cal.—Engineer G. M. Lorraince of the Sacramento and Lake Tahoe railroad has begun work at this point on the survey for the projected railroad.

Vancouver, Wash.—The town council has granted a franchise to the St. Helens Public Service Company for the construction of electric railways along certain of the public streets.

Redwood City, Cal.—The Ocean Shore Railway Company has three gangs of men at work excavating for its new road. The company is still securing rights of way in this county.

SUISUN, CAL.—J. A. Keys has applied to the Board of Supervisors for a franchise to construct and operate an electric railway connecting Suisun, Fairfield, Vacaville and Winters.

CHICO, CAL.—The Northern Electric Company has purchased forty cars for use in the construction of electric railroads between Chico and Oroville and other points in Northern California.

South Bend, Wash., The city council has passed an ordinance granting to J. W. McKenzie a franchise to construct and operate street railway lines along the streets of South Bend.

Los Angeles.—It is announced that Hueneme Malibu and Port Los Angeles Railway Company will at once begin work on the construction of an electric railway line from Santa Monica to Los Angeles.

Seattle, Wash.—Frank Hubbel has asked for a street railway franchise up the steep hill on Union street from Ninth to Terry avenue and on Ninth avenue from Union to University street.

COLFAX, WASH.—The Spokane and Inland Electric Railway Company has purchased property for terminals in this city. A passenger depot, freight depot, five warehouses and 1,500 feet of side track will be put in.

San Diego, Cal.—The city council has granted four franchises for electric street railways in this city. One franchise was granted to Messrs Holley and Collier, one to Barbee S. Hook and two to Bartlett Webster.

Sacramento, Cal.—T. W. Sheehan has applied to the Board of Supervisors of Sacramento County for the privilege of constructing electric railroads on the M street road to a point near Perkins and thence to Florin and Elk Grove.

San Francisco.—At a special meeting of the Board of Works on October 7th resolutions were adopted authorizing the Ocean Shore Railway Company to begin work at once within the city and county limits on its new electric railway line.

Oakland, Cal.—The San Francisco, Oakland & San Jose Railway Company has applied for a franchise for a street railway line from Yerba Buena avenue, near Hollis street, along Twenty-second street to Broadway.

Napa, Cal.—The Vallejo, Benicia and Napa Valley Railroad Company has asked for an injunction restraining the San Francisco and Napa Railroad Company from building a railroad across the plaintiff's right of way northwest of Napa.

SACRAMENTO, CAL.—Superintendent Fitzpatrick, of the Sacramento Gas and Electric Railway Company, states that the trolley line will be at once extended from the Jay street terminus to Schley avenue, and thence to the grounds of the East Lawn cemetery.

Stockton, Cal.—DeWitt Clary, representing the Central California Traction Company, has applied to the Board of Supervisors of San Joaquin County for a franchise to construct and operate an electric railroad from Stockton to Lodi and adjacent points. The board decided to advertise the franchise.

Boise, Idaho.—The construction of the Boise Interurban Railway began on September 25th and the work of grading and track laying is now under way. The promoters of the line have not yet completed plans for a power plant. They contemplate a plant capable of generating 300 h. p. and a total expenditure of about $150,000.

EVERETT, WASH.—Robert Houston has transferred to F. E. Sander his right of way for an electric railway line from the city limits of Everett south to the county line, and Mr. Sander has transferred this franchise, together with another one held by him in King County, to the Seattle-Everett Interurban Railway Company.

Napa, Cal.—The Clear Lake & Southern Railroad Company now has surveyors at work surveying a route for an electric railway line to run through Marin, Napa and Sonoma Counties. On October 14th condemnation suits were filed against eleven owners of property in Napa County for right-of-way for the railroad.

Los Angeles.—All the necessary material for the construction of the Los Angeles-Pacific Electric Company's extension through the Soldiers' Home grounds and the Palisades to Santa Monica is now on hand and construction work is again under way. Officials of the company hope to have the work completed at the time originally planned.

Eugene, Ore.—A. R. Black and associates have asked the city council for a franchise to build and operate an electric railway from the Southern Pacific depot to the eastern limits of the city, construction work to begin within one year and for a similar franchise on Fifth street from Willamette street to the city limits, work to begin within two years.

SAN FRANCISCO, CAL.—Engineer J. C. H. Stut has filed with the Board of Supervisors a statement showing the relative difference in cost to the city according as the power house for the proposed reconstructed Geary street railroad is located at the corner of Geary and Baker streets or at Point Lobos avenue and Josephine street. Mr. Stut estimates that it will cost $7,050 less for conduit expenses if the former location is chosen.

San Jose, Cal.—On October 14th Hugh Center, manager of the San Jose, Santa Clara & Alum Rock Electric Railway officially announced that the sale of that road to Lewis E. Hanchett and associates have been finally concluded. The new owners will take possession on November 1st. Surveyors are already at work surveying for a standard track from

Santa Clara to Alum Rock, and it is understood that the entire line will be rebuilt and modernized.

Centralia, Wash.—Two applications have been made for franchises to build electric railway lines in this place. W. W. Canon, Frank Scott, A. S. Nicholas and Robert Pettit have asked for a franchise for a local line with no outside connections. The promotors state that they intend to construct a plant at Pe Ell, from which point electricity will be carried under high tension to a sub-station half way between Centralia and Chehalis. The other company, which is controlled by J. W. Rich of Chicago and V. S. Rowley of Seattle, is organized to construct a long distance line running from Tacoma through Centralia and Chehalis to Portland.

ILLUMINATION.

Missoula, Mont.—Joseph Ottinger has asked the city council for a franchise to conduct a gas plant in this city.

BICKLETON, WASH.—H. T. Latham, of this place, is figuring on the installation of an electric lighting plant at this place.

Coalville, Utah.—The city council has approved the plans and specifications for the power house for the electric light plant here.

LOS ANGELES, CAL.—The Los Angeles Gas Company is preparing to extend its piping system to some of the outlying districts.

MAYFIELD, CAL.—The town trustees have awarded a contract to the Gas and Electric Company for lighting the streets of Mayfield during the next three years.

North Yakima, Wash.—The Northwestern Gas & Electric Light Company has been granted a franchise for a gas plant and piping system at this place.

Junction City, Ore.—J. N. Fellener is preparing to erect an electric light plant at this place. He states that he will be able to furnish light in six weeks.

ROSEBURG, OR.—The electors of this place have voted in favor of issuing bonds to the amount of $200,000 for the purpose of constructing a municipal light and water plant.

San Bernardino, Cal.—William Buxton, proprietor of the hotel Del Rialto, is preparing to install an individual electric and gas plant, which will be used in lighting the hotel.

Selma.—The San Joaquin Power Company has made application to the town trustees for a franchise to install a plant for supplying the town with electricity, light and power.

CASTLEDALE, UTAH—J. W. Seeley and C. L. Allen have been granted a franchise to construct and operate an electric light plant here. A 650 16-candle plant will be constructed to start with.

SAN BERNARDINO, CAL.—The Home Gas Company, of this place, has had solicitors at work in Colton for several days, and if sufficient contracts can be secured the company will extend its pipes to that place.

Tonopah, Nev.—J. B. Quigley announces that he has secured a site for a large gas plant at this place, and that machinery and equipment for a plant will soon be shipped from San Francisco.

Everett, Wash.—The city council has passed a resolution asking for bids for city lighting. Bids will be received for terms of five, seven and ten years, to begin with the expiration of the present contract next March.

Victoria, B. C.—The city council has awarded the contract for the construction of the electrical plant for street lighting purposes to the Hinton Electric Company, the plant to be of the Canadian General Electric Company's manufacture.

San Francisco.—The San Francisco Coke & Gas Company has contracted with Healy-Tibbits Construction Company for the foundation for a large gas holder in the block bounded by Jefferson, Beach, Powell and Mason streets.

GRANTSVILLE, UTAH—The Clark Electric Power Company, of Tooele, has secured a franchise to erect poles and establish an electric lighting system in Grantsville. A transmission line 12 miles long will connect Tooele city with Grantsville.

Santa Ana, Cal.—The town trustees have instructed the city attorney to formulate a resolution calling for an election to vote on the question of issuing bonds for the purpose of constructing municipal gas and electric lighting plant.

Mountain View, Cal.—A committee consisting of W. A. Clark, D. B. Frink and O. Becker has been appointed by the Board of Trade to take preliminary steps looking to the establishment of a municipal light and power plant at this place.

Richfield, Utah.—The County Commissioners have granted the application of Thomas Brown, James Christianson and H. N. Hayes to erect and maintain poles, wires, and other fixtures for an electric lighting plant in the town of Glenwood and outlying districts.

Middleton, Cal.—The Board of Supervisors have granted the application of G. E. McKinley of Middleton for a franchise to erect poles and wires for transmitting electricity for light, heat and power along the public streets of Middleton and the highways leading thereto.

Corona, Cal.—Wm. Corkhill has been appointed by the Mayor to engage an expert to investigate into the value of the property of Corona Gas & Electric Company to determine if $58,000, the price asked by the company, is a fair valuation, and to estimate the cost to the city of building a new plant.

Dillon, Mont.—The Dillon Electric Light & Power Company has begun the reconstruction of its entire system in this city. The steam plant is to be improved at a cost of $6,000 and the transmission line between the plant and the city, which now consists of No. 8 copper wire, is to be replaced by No. 4 copper wire.

Eugene, Ore.—The City Council of Eugene has passed a resolution providing for the issuing of bonds to the amount of $100,000, the proceeds to be used in the construction of a municipal lighting plant. Another resolution authorizing a committee to proceed with a preliminary survey for transmission lines and for a lighting plant was also passed.

SEATTLE, WASH.—City Engineer Thomson and L. V. Youngs, superintendent of the city water and lighting department, have just completed an inspection of the city's power plant on Cedar River. Mr. Thomson states that plans are being made to add another unit to the lighting plant, which will give about 5,000 H. P. to the plant. The additional unit will represent an outlay of $15,000.

Missoula, Mont.—At a meeting on October 10th the city trustees rejected all bids for street lighting and decided to advertise for new bids to be opened on November 6th. Bids are to be received for the city lighting for terms of two, three and ten years. Each bid is to be accompanied by a certified check of $500 and a bond of $10,000 for the faithful performance of the contract.

Los Angeles.—The Los Angeles Gas & Electric Company was the only bidder for the city lighting. The company's

bid was $6.60 per month for each street light on a one-year contract, $6.30 on a three-year contract and $6 on a five-year contract. A motion made at the last meeting of the city council to appoint a special municipal ownership committee to report on the feasibility of a municipal gas plant failed to receive a second.

Gilroy, Cal.—Engineer Thirber of San Jose, who was employed by the city council to furnish an estimate of the cost of an electric lighting plant, has submitted an estimate calling for $14,500. This is somewhat in excess of the funds available, but the council decided to advertise for bids, to be submitted on or before October 28th, for the construction of the plant according to specifications and for the material needed for transmission lines.

San Diego, Cal.—Manager Hunt of the San Diego Consolidated Gas & Electric Company states that company's gas plant will be remodeled and improved at a cost of approximately $40,000. New machinery has already been ordered, which it is expected to have in place by the middle of February, 1906. The company has also secured estimates on the extension of its electric system to La Jolla. Several miles of new gas piping will be put in in the city.

Redlands, Cal.—All the officers of the Redlands Gas Company resigned this week and a new body was elected. Geo. B. Ellis, who had been president since the organization of the company, resigned and John B. Miller, president of the Edison Electric Company, was named in his stead, Halsey W. Allen vacated the position of secretary, which was filled by W. L. Percey, and R. H. Ballard will act as treasurer instead of the First National Bank. F. P. Morrison will continue to act as director and vice-president.

Albuquerque, N. M.—The Albuquerque Gas, Electric Light & Power Company has commenced work on its new gas plant which is being erected near the old electric light plant, Albuquerque, on the east side of the Santa Fe tracks. A. Van Pitt has the contract for the two buildings. One will be a retort house 33x60 feet and twenty feet high, the other will be a purifying house and meter room 23x34 feet. The buildings are to be of stone, manufactured by the Laughlin Hydraulic Stone Company, and the contract calls for their completion in two months.

TELEPHONE AND TELEGRAPH.

Corona, Cal.—The Town Trustees have sold a telephone franchise to A. C. Wood for $125.

STOCKTON, CAL.—The City Council has denied the application of P. K. Higgins for a telephone franchise in this city.

Ontario, Cal.—The town trustees have advertised for the installation of a new telephone system in that town.

BERKELEY, CAL.—H. N. Mayberry has applied for a franchise to string telephone wires in the streets of Berkeley.

Petaluma, Cal.—The Pacific Wireless Telegraph Company has decided to establish a station at this point.

Grass Valley, Cal.—The Board of Trustees has denied the application of P. K. Higgins for a telephone franchise here.

Colton, Cal.—The Home Telephone Company will erect a new building on I street between Seventh and Eighth streets in that town.

MEXICO—About two thousand kilometers of wire will be strung on the Federal telegraph line between this city and Pueblo.

BERKELEY, CAL.—The town trustees have contracted for the installation of twenty telephone patrol alarms for the use of the city police force.

Ontario, Cal.—The town trustees have granted a franchise to D. W. Wynne to erect and maintain telephone lines in the streets of Ontario.

Oregon City, Ore.—The City Council has granted the application of Frank R. Andrews to erect and maintain telephone wires and poles in the streets of Oregon City.

Lewiston, Ida.—The Pacific States Telephone Company, with headquarters at Spokane, Wash., will install at Lewiston improvements in the system to cost $12,000.

SAN FRANCISCO, CAL.—The Pacific Wireless Telegraph Company reports arrangements well under way for the construction of a wireless telegraph station on Mt. Tamalpais.

Redding, Cal.—The Bully Hill Company has been granted a franchise to build a new telephone line from Redding to its mine. The company has already commenced the survey of the new line.

San Luis Obispo, Cal.—The Board of Supervisors have granted the application of E. D. Warner and others to construct a private telephone line along the ditch of the Arroyo Grande Ditch Company.

Albuquerque, N. M.—C. B. Cooper, superintendent of the American DeForrest Wireless Telegraph, is now in Albuquerque. He states that a wireless station will be erected at that place at once.

OAKLAND, CAL.—The City Council of Oakland has granted the application of the Home Telephone Company, of Alameda County, asking that bids be received for a telephone franchise in this city.

ASTORIA, OR.—W. W. Whipple, who was recently granted a franchise for the construction of a telephone line in this place, has complied with the terms of the grant and is preparing to begin work.

Eureka, Cal.—The County Supervisors have advertised for bids for a franchise to erect and maintain telephone lines along the public roads from Blocksburg to Carlotta in Humboldt County.

Berkeley, Cal.—At its last meeting the Board of Trustees of Berkeley rescinded its former action authorizing the installation of police alarm boxes by the Signal Alarm Company of Milwaukee. The board will now advertise for bids.

Chico, Cal.—The farmers residing north of Chico and near the vicinity of Shasta County have organized themselves into an active body for the purpose of getting telephonic communication with Chico. The construction of various lines will begin next week.

Los Angeles, Cal.—The Board of Supervisors have granted the Home Telephone & Telegraph Company a thirty-year franchise to construct and operate a telephone system adjacent to Los Angeles within a radius of eight miles from Ninth and Main streets.

Douglas, Ariz.—The United States Government has decided to offer for sale the Old Military Telegraph line which runs from Don Luis through Douglas to San Bernardino ranch, which was erected by the Government during the Indian troubles in 1898.

Truckee, Cal.—The Sunset Telephone & Telegraph Company is now shipping supplies to Truckee preparatory to making several changes in its lines in that place and at different points around Lake Tahoe. All the resorts around Lake Tahoe will be connected next summer by telephone with the exception of Brockway.

Prescott, Ariz.—The Consolidated Telephone Company has secured a franchise to erect poles and maintain a telephone line between Ash Fork and Kingman connecting with the present system at Jerome on the East and through a branch line to Goldroads with the Kingman and Needles line on the West.

Oakland, Cal.—On October 16th the City Council finally passed the ordinance asking for bids for the telephone franchise applied for by the Home Telephone Company, bids to be opened on December 4th. The Home Telephone Company agrees to bid not less than $20,000 for the franchise. The ordinance does not become effective until signed by the Mayor.

PRICE, UTAH—The newly organized Eastern Utah Telephone Company has purchased 52 miles of telephone line running between Price and Ferron, of Levi H. Harmon and associates. Contracts will soon be let connecting the new company's lines with the Rocky Mountain Bell Telephone Company's lines at Colton and for building lines to Sunnyside, Clear Creek, Scofield, Winter Quarters, Castle Gate and Helper. About $20,000 will be spent.

Washington, D. C.—The Bureau of Equipment of the Navy Department has announced its intention to establish wireless telegraph stations at Table Bluff, Fort Arguello and San Diego, Cal.; at Puget Sound Naval Station, Point Wilson and Cape Flattery, Wash., and at North Head, at the mouth of the Columbia, and Cape Blanco, Ore. Work will be begun at once on the stations at the Puget Sound Navy Yard and Fort Arguello.

WATER WORKS.

LOS ANGELES, CAL.—The Papago Mining Company is preparing to pipe water a distance of one mile to its mines.

TUCSON, ARIZ.—The City Council has let contracts to the Steinfield Company for water mains on its bid of $19,260.

OGDEN, UTAH—The City Council has granted the Citizens' Water Company the right to operate a water system here.

St. Johns, Ore.—The Thompson & Powers Company has offered to sell its water works plant in this city to the municipality for $30,000.

Ensenada, L. C.—W. A. Vernon, of Los Angeles, has purchased the Ensenada Water Works and will make extensive improvements.

RENO, NEV.—P. L. Flanigan, representing the Union Water Company, has asked permission to run a 12-inch pipe line across the Truckee River.

MONROVIA, CAL.—The Board of Trustees has awarded contracts for screw pipe for the water works to Allen H. Nye and for riveted pipe to the Baker Iron Works.

SANTA BARBARA, CAL.—The municipality has purchased the property and business interests of the Montecito Water Company for $5,000.

WHITTIER, CAL.—The Lacy Manufacturing Company has been awarded the contract for furnishing the municipality of Whittier with steel pipe on its bid of $22,000.

Nampa, Idaho.—A special election will be held in this city for the purpose of voting on a proposition to issue bonds for the extension and improvement of the city water works.

Monrovia, Cal.—The town authorities will undertake to conserve about 10,000,000 gallons of water by bulk-heading the Twin Spring tunnels in Sawpit Canyon.

Morgan Hill, Cal.—The Morgan Hill Water Company is making improvements in its plant and is preparing to spend about $5,000 in increasing the supply and in other improvements.

Cottage Grove, Ore.—The only bid submitted to the town council for the North Creek water mains was submitted by D. Parini, the amount being $1,907.75. The award was not made.

San Luis Obispo, Cal.—The town trustees have appointed a committee with power to employ an engineer to examine into and report upon the best means of securing an additional water supply.

SAN BERNARDINO, CAL.—The Bear Valley Mutual Water Company has filed on 500,000 inches of water in the Santa Ana River and will construct a reservoir capable of impounding 1,296,000,000.

Red Bluff, Cal.—Appraisers have been appointed to appraise the plant and franchise of the Antelope Water Company preliminary to the purchasing of the company properties by the municipality.

Pasadena, Cal.—It is announced that the plan to sell the North Pasadena Water plant to the city for $80,000 has fallen through with and that the water company will proceed with needed alterations and additions.

OLYMPIA, WASH.—H. C. Heermans, president of the Olympia Water Company, states that a new pump, a steel flume up Moxie Creek and other improvements costing in the aggregate $20,000 will be made shortly.

Black Diamond, Cal.—W. P. Rigney has filed a claim for 75,000 inches of water to be taken from Old River for the purpose of furnishing water to Byron, Brentwood, Livermore, Pleasanton and other towns.

Olympia, Wash.—The City Council has passed a resolution directing the city attorney to prepare an ordinance condemning the water plant of the Olympia Water Company. This is preliminary to a movement to establish a municipal plant.

Merced, Cal.—The Merced Falls Gas and Electric Company has contracted with the Western Iron Works, San Francisco, for a 30,000-cubic-foot steel container in wooden tank gas holder. The company is preparing to lay a new gas main in extending their service.

Los Angeles.—The Crane Company has been awarded a contract for 36,000 feet of 2-inch standard water pipe at a price of $9.28 per hundred feet by the city water commission. Bids for the remainder of the supplies were laid over until the next meeting.

SAN DIEGO, CAL.—The City Council has instructed the Board of Works to advertise for four-inch cast iron pipe in lots of two, five and ten carloads. The pipe will be used in extending the city water works. The City Council has received a petition to have 3,900 feet of six-inch pipe laid on Point Loma.

Port Townsend, Wash.—The new water works system for Fort Casey is completed and has been turned over to the Government by the contractors, McInnis & Harrington. There is yet to be built a 150,000 gallon steel tank in connection with the plant. The cost of this water plant in its entirety will be $27,680.

RENO, NEV.—The Hunter Creek Water Power Company, of Reno, has transferred all its interests to the newly organized Union Power, Light and Water Company. Governor Sparks, of Nevada, will be made president of the new company. The Governor states that the new company will at once pipe water from Hunter Creek to Reno and Sparks.

Mount Tabor, Ore.—Bids were opened October 15th for material and labor to be used in the construction of a pipe line to be laid from the Mount Tabor reservoir to the Peninsula, but no awards will be made until the engineer of the water board can total the bids and learn which is the lowest. The entire line when completed will cost about $250,000.

Corvallis, Ore.—The city authorities have awarded contracts for the municipal water system as follows: To the Crane Company for steel pipe and hydrants, to the Washington Wood Pipe & Foundry Company wooden pipe, and to W. H. Mitchell of Seattle the construction work. Work will be done under the supervision of Engineer G. N. Miller.

Billings, Mont.—The city council has secured the services of H. W. Scott, assistant engineer of Seattle, who will draw plans and make estimates for a low pressure gravity water system. The franchise of the Billings Water Power Company will expire within a few months and the officials of the company and of the city have so far been unable to agree upon a price for the company's plant.

Prescott, Ariz.—Upon the recommendation of Superintendent Chas. A. Glass, of the Prescott Municipal Water Works, the bids of the following have been accepted: Smith Machinery Company, Gould pump; Westinghouse Electric & Manufacturing Company, electric apparatus; John A. Roebling's Sons Company, copper wire; John Martin, miscellaneous supplies, and the Prescott Engineering Works, pipe and fittings.

McMinnville, Ore.—Engineer W. M. Bostaph has made an estimate of the cost of pipe lines and reservoirs and of bringing water to E street in this city, as follows: 14,500 feet of 8-inch wood pipe, $8,260; 4,600 6-inch Cowals Creek line, $1,910; 7,500 4-inch pipe, $2,150; head work, $650; collecting basin, $200; reservoirs $7,000; possible contingencies, 5 per cent, $1,346, and incidentals, $4,000, making a total of $38,773.

Corvallis, Ore.—Bids for the construction of a gravity system of water works for Corvallis were opened on October 10th. H. Mitchell, of Seattle, offered to put in a pipe line and distributing system complete with wooden stave pipe for $55,600. Another bidder offered to put in a wooden stave pipe line and steel distributing system complete for $77,000. Other bids, of which there were a large number, were for separate items of material and construction. The funds available for the work amount to $75,000.

OIL.

Portland, Ore.—A permit has been issued to the Associated Oil Company granting that company the right to construct a wharf and pipe line in this city.

Santa Clara.—The town trustees have sold a pipe line franchise to the Independent Producers' Union Pipe Line Company to lay pipe through the streets of Santa Clara.

San Francisco.—The National Oil Transportation Company, operating the Monterey pipe line from Coalinga fields, took over the business of the Associated Oil Company in that section on October 1st.

Santa Maria, Cal.—G. H. Morrow of Oakland, agent for the Pacific Coast Oil Company, is here for the purpose of securing line privileges from the various oil companies operating in this field.

San Luis Obispo, Cal.—Paul M. Gregg, representing the Union Oil Company, has asked the Board of Supervisors of this county to advertise for the sale of a franchise for the construction and operation of an oil pipe line across the highways of the county.

Bakersfield, Cal.—F. B. Henderson has resigned his position as superintendent of the Associated Oil Company and has been appointed superintendent of the Amalgamated Oil Company in Los Angeles. J. E. Merritt has succeeded Mr. Henderson as superintendent of the Associated Oil Company.

BAKERSFIELD, CAL.—The Southern Pacific Company has let a contract for the construction of a nine-inch corrugated pipe line to run from Volcan to Delano, to the Shatuck & Desmond Warehouse Company. The company will receive 16.5c per foot. The total cost of the pipe line is placed at $225,000.

BAKERSFIELD, CAL.—The Independent Oil Producers' Agency has taken preliminary steps for the formation of a company embracing all the independent companies in the Kern River district. The leading spirits in the movement plan an independent pipe line to tidewater and the construction of a 2,000,000-barrel reservoir for storage purposes.

Portland, Ore.—Officials of the Harriman railroad lines have contracted for a chain of oil tanks which will supersede the coal bunkers along the Southern Pacific and the Oregon Railway and Navigation Company lines in Oregon. Six tanks will be constructed along the Southern Pacific lines, the largest one, holding 55,000 barrels, to be located at Roseburg. Tanks holding 30,000 each will be erected at Grants Pass and Junction City, a 15,000-barrel tank will be erected at Whiteson and 5,000-barrel tanks will be erected at Albany and Springfield. Five tanks of varying capacity will be erected on the lines of the Oregon Railway & Navigation Company.

MISCELLANEOUS.

San Francisco.—The annual meeting of the Richmond Light & Power Company will be held in the Crocker Building on November 6th.

Anaheim, Cal.—The stockholders of the Anaheim Gas Company, through Geo. M. Ross, secretary, have offered to sell the plant to the city at a cost of about $25,000.

San Francisco.—Bids will be received up to October 31st by the California Safe Deposit Trust Company for the bonds of the Sacramento Electric, Gas & Railway Company, together with all unpaid coupons annexed.

San Francisco.—A special meeting of the stockholders of the Pacific Gas & Electric Company has been called for December 19th, for the purpose of acting on a proposition to create a bonded indebtedness of $10,350,000.

Portland, Ore.—The reorganization of the Portland Consolidated Railroad Company has been completed. The stock of the company is now owned by E. W. Clark & Co. of Philadelphia, J. and W. Seligman of New York and D. O. Mills of New York.

Tonopah, Nev.—The Southern Nevada Electrical Works, of which Harry Richards and G. C. Higgins are respectively manager and secretary-treasurer, has just opened for business in Tonopah. They have secured a contract to install the electrical service for the Tonopah district messenger service.

Oakland, Cal.—A call has been issued by the Board of Directors of the San Francisco, Oakland & San Jose Railway Company for a special meeting of stockholders to be held on December 21st for the purpose of considering and acting upon the proposition of creating an additional bonded indebtedness of $1,500,000, the proceeds to be used in making extensions to its system and in the purchase of railroads, rolling stock, etc.